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**Class III Milk  
in the New York Milkshed  
VI- Economic Analysis  
of Class III Pricing**

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE  
MARKETING ECONOMICS RESEARCH DIVISION





## PREFACE

This report is the last of a group dealing with Class III milk pricing in the New York-New Jersey milkshed. The project under which this group of publications has been developed was carried out by the Marketing Economics Research Division, Agricultural Marketing Service. A substantial part of the cost was financed by a grant from the New York-New Jersey Milk Market Administrator. This project is part of a broad program of marketing research aimed at expanding markets for farm products and improving the efficiency of marketing.

Previous reports in this group were:

Class III Milk in the New York Milkshed:

- I Manufacturing Operations
- II An Economic Description of the Manufactured Dairy Products Industry
- III Costs of Manufacturing Dairy Products
- IV Processing Margins in Manufacturing Dairy Products
- V Processors' Decision on Utilization

The main purpose of the previous reports was to describe the supply and utilization of Class III milk, the marketing of products of that milk, and some characteristics of the firms which handled Class III milk; and to estimate costs and margins for some Class III products.

This report, part VI, discusses principles of efficient pricing of milk in fluid milk markets under perfect competition, and how those principles might be modified to fit conditions of seasonally fluctuating milk supplies and a system of pricing according to use. The report also has a summary of principles advocated by witnesses at hearings on proposals for changes in the Class III provisions of the New York-New Jersey Milk Marketing Order. The remaining sections of the report relate to the marketing of Class III milk and its products. Out of a consideration of the structure of the market and some characteristics of the supply and demand for specific products of Class III milk, some conclusions are offered about the direction in which utilization might be expected to shift with lower or higher Class III prices, and a rationale that might be followed in fixing the Class III price.

The work on which the reports are based was done by a research team composed of Donald B. Agnew, F. W. Cobb, Jr., C. E. McAllister, and T. R. Owens, under the general supervision of D. A. Clarke, Jr. (on leave from the University of California). Additional assistance was obtained from Irving Dubov (on leave from the University of Tennessee). Part of this report was a result of work done under a project of the California Agricultural Experiment Station.

The cooperation of representatives of the dairy industry, as well as members of the various regulatory agencies, is gratefully acknowledged. R. G. Bressler, Professor of Agricultural Economics, University of California, and consultant to the Marketing Economics Research Division, contributed substantially to the analysis of the problem with which the study deals, and to the planning of the work. His article, "Pricing Raw Product in Complex Milk Markets" (Agr. Econ. Res. 10(4):113, October 1958), embodies a part of this contribution.

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## SUMMARY

This is the sixth and final report of a study which was undertaken to learn what effects regulation has had on the market for Class III milk and to investigate the factors that enter into the determination of Class III prices.

Minimum prices paid by handlers for milk in the New York-New Jersey milkshed are fixed by Government regulation. This regulation provides for the use of separate--or class--prices for milk according to use. In this milkshed, Class I milk includes that sold for fluid use within the designated marketing area. Class II milk includes all of that separated into cream and sold as fluid cream or sour cream within the metropolitan New York City district of the marketing area, and some milk drinks. All other milk, primarily for manufacture into dairy products, is Class III milk.

Before 1949, eight separate classes were used for milk in the market pool that exceeded Class I and Class II requirements, depending upon the specific commodity produced. In April of that year, an amendment to Federal Milk Marketing Order No. 27 consolidated these eight classes into a single category, Class III. The 1949 amendment also put into effect a formula for pricing Class III milk that used butter prices and nonfat dry milk solids prices as movers. In later years, further amendments modified the factors in the Class III price formula but most of the changes were minor. The principal change was made in 1956 when seasonal adjustment was added to the Class III price. Although all milk in excess of Class I and Class II sales is included in a single class, handlers are allowed a credit--the butter and cheese adjustment--for all Class III milk used to make butter and hard cheeses. Currently, the amount of this adjustment varies seasonally and ranges from 14 cents per hundredweight in the peak production seasons of March through June to zero during the short season of August through November.

Price determinants for milk are complex and highly interrelated. They include many physical, institutional, and economic factors. Important among these is the relative market power of the individual firms which make up the industry, as well as the operations of governmental price-fixing agencies. Many of the price-affecting variables are not subject to measurement. Furthermore, the relative importance of these factors may change from time to time, with first one and then another exerting more influence.

In addition to and in conjunction with establishing prices within the milkshed, the marketing order also sets forth operating procedures that influence prices. One of these is the classified price plan, the other the pooling procedure. The number of classes and the level of each class price affect both the demand of buyers and the net income of producers. The type of pool base, whether wide or restricted, influences the total supply of milk available in the pool. All of these considerations enter into the conclusion that there is no way to measure or establish a Class III price that will equilibrate precisely all the factors at work over a period of time.

Despite the lack of exact measuring devices, some indicators exist that may be of real value in evaluating Class III prices. These include comparisons with prices paid producers in other areas for milk used for similar products, measures of the profitability of manufacturing operations with raw product costs based on Class III prices, and estimates of the cost of obtaining the ingredients of manufactured products from alternative milk sources.

While not conclusive, each of the above comparisons tends to show that Class III

prices have been generally favorable to manufacturers utilizing Class III milk from the New York-New Jersey pool, and are lower than competitive levels.

This conclusion, furthermore, should not be too surprising. In essence, the pricing agency is presented with two rules: (1) Prices must be fixed for all classes of milk, and (2) these prices must clear the market. The highest price that can be set for the lowest-value use (in this situation, the Class III price) is the price that would exist under competitive conditions in the sale of milk of that type. Errors of judgment, caused particularly by the lack of adequate data, make the administered price deviate from the competitive price. The possibility of such deviations forces the pricing agency to make its errors on the conservative or low side. To do differently would violate the second rule and not all milk would find a market.

Various possibilities for changing procedures to eliminate the requirement that established Class III prices must be lower than competitive levels are explored. These include programs to limit supply, providing for competitive determination of Class III prices, and the possibility of establishing further use-classifications for milk processed into products currently designated as Class III. Each of these alternatives involves removal of either one or the other of the two restraints on the pricing agency--the rules previously discussed.

Consideration is also given in this report to the economic principles involved in continuing to maintain a price differential for Class III milk between that used for butter and hard cheeses and that utilized for other manufactured dairy products. In addition, the possibilities of further class segmentation and price differentiation between Class III products are discussed.

Because substantial seasonal supplies of milk must find an outlet in the butter and cheese markets, the alternative to price differentiation of the type afforded by the butter and cheese adjustment is a single price for all milk within the class. The price must permit profitable operation of butter and cheese manufacturing plants.

The possibility of increasing returns to milk producers by differentiating prices between other Class III products depends upon the existence of two conditions. First, the reaction of buyers to changes in price must be different among the various groups of products. Second, buyers must be unable to substitute milk or the ingredients of milk from nonpool sources at less than pool prices.

In short, major adjustments in the level of Class III prices in this milkshed must be accomplished through a revision of procedures. Therefore, gains that may come about as a result of increased prices must be measured against the costs of the revised procedures. These costs include the restrictions and inequities associated with programs designed to control marketed quantities and the dangers that may be involved in releasing part (though not all) of the pricing mechanism from administered control.

## CLASS III MILK IN THE NEW YORK MILKSHED

### VI. ECONOMIC ASPECTS OF CLASS III PRICING

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#### THE PROBLEM

The primary function of the New York-New Jersey milkshed is to meet the fluid milk and fluid cream requirements of its market. The seasonal characteristics of both the production and the demand for fluid milk are such, however, that adequate supplies throughout the year cannot be assured unless production consistently exceeds consumption. Since whole milk cannot be stored, the excess is processed into manufactured dairy products.

The New York-New Jersey milkshed is shown approximately by figure 1. The milkshed supplies milk to the marketing area shown by the shaded portion of the map. Milk eligible for sale in fluid form within the marketing area is subject to price regulation under the provisions of Federal Milk Marketing Order No. 27. <sup>2/</sup> This order provides for three use classes. Milk sold in fluid form is designated Class I. <sup>3/</sup> Class II milk sales include milk separated into cream for fluid use and that made into specified milk drinks when sold in the Metropolitan District--including Westchester, Bronx, New York, Richmond, Kings, Queens, Nassau, and Suffolk counties (except Fisher's Island). The remaining uses of milk--including cream not otherwise designated as Class II, cheese, homogenized mixes, butter, and other manufactured dairy products--are included in Class III.

A discussion of the amount of Class III milk available in the New York-New Jersey milkshed, its seasonal pattern, and utilization is presented in another report (3). <sup>4/</sup> Typically, the amount of Class III milk in this milkshed ranges from about 30 percent of total production in the fall to 50 percent or more during the spring. If the milk is to be efficiently and effectively utilized, adequate processing facilities and adequate market outlets for the manufactured products must be available. Providing these facilities and developing these markets are the jobs of the firms which make up the dairy industry in this area. The willingness and ability of these firms to undertake these functions depends in large part on the cost of the raw milk--the Class III price--relative to market prices of the manufactured products.

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<sup>1/</sup> D. A. Clarke, Jr., professor of Agricultural Economics, University of California, was employed by the Agricultural Marketing Service while on leave from the University, but his contribution also reflects work under a project of the California Agricultural Experiment Station.

<sup>2/</sup> In addition to Federal Milk Marketing Order No. 27, milk sold in the shaded areas in New York State and in New Jersey is regulated by New York State Order No. 126 and New Jersey State Order No. 57-3. The provisions of these two state orders are identical with Order No. 27 as they affect the sale of milk in these areas.

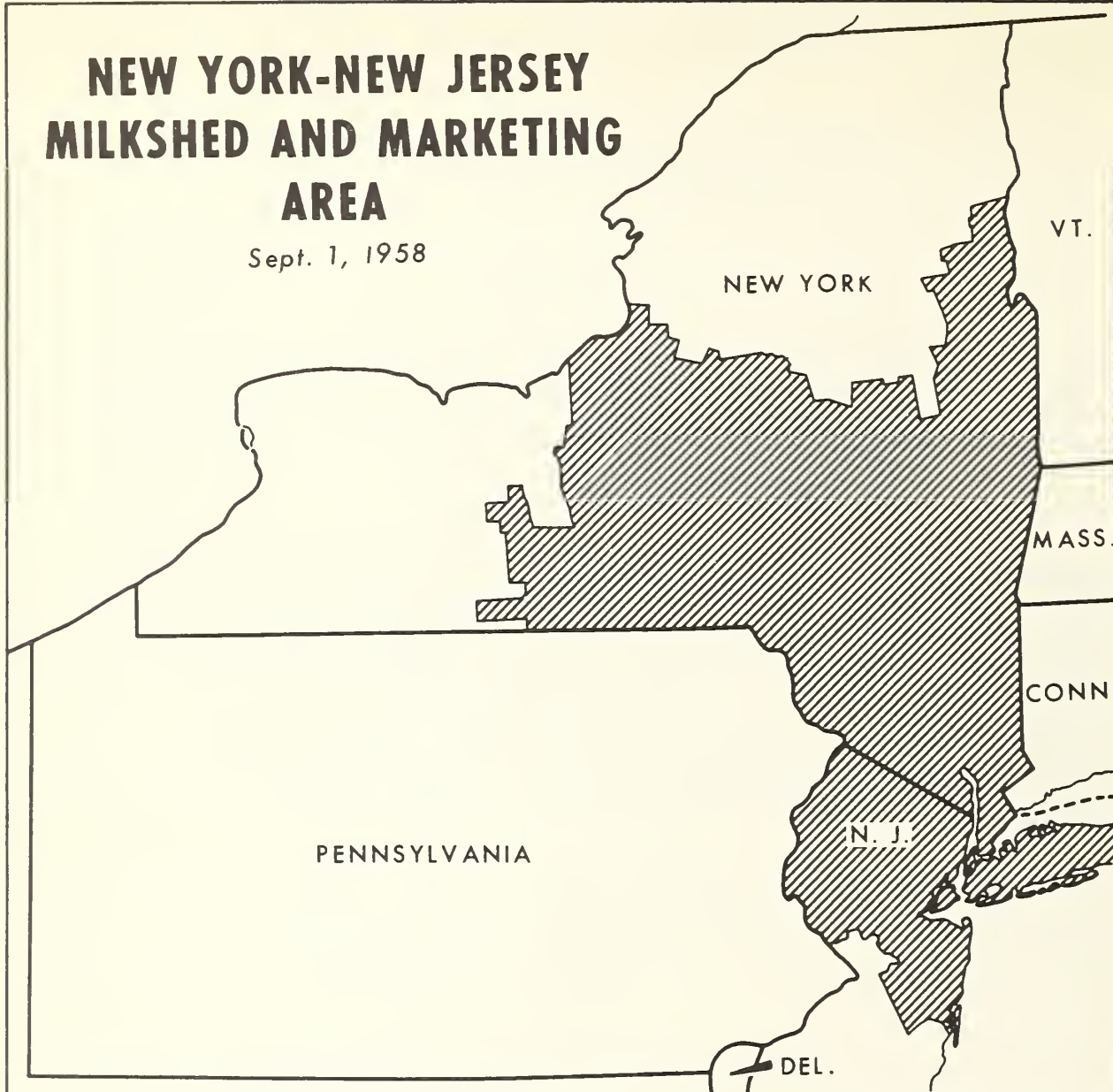
<sup>3/</sup> A distinction is made between milk sold in fluid form within the marketing area (I-A) and regulated milk sold for fluid purposes in markets outside the marketing area (I-B). At present, however, the I-A and I-B prices are identical.

<sup>4/</sup> Underscored numbers in parentheses refer to items in the Literature Cited, page 52.



# NEW YORK-NEW JERSEY MILKSHED AND MARKETING AREA

Sept. 1, 1958



MARKET ADMINISTRATION, NEW YORK-NEW JERSEY MILK MARKETING AREA, FEDERAL ORDER NO. 27,  
NEW YORK STATE ORDER NO. 126, NEW JERSEY STATE ORDER NO. 57-3.

U. S. DEPARTMENT OF AGRICULTURE

NEG. 8307-60 (12) AGRICULTURAL MARKETING SERVICE

Figure 1

This is the sixth and final report of a group dealing with problems of Class III milk pricing in the New York-New Jersey milkshed. The specific objective of the present study is to examine the effects of changes in the level of Class III prices in this milkshed on the willingness of the dairy industry to absorb milk produced in excess of the Class I and Class II requirements of the market. The main topics of the study are: The market characteristics of the products manufactured from Class III milk; the factors entering into determination of prices for milk for manufacturing in a fluid milkshed; the nature and effects of the classified price system along with the provisions for pooling procedures; a brief summary of industry testimony and Class III price hearings; a discussion of pricing formulas used for setting Class III prices in the New York-New Jersey milkshed, together with changes that have occurred in recent years; the alternative measures of evaluating the level of Class III prices; and, finally, a brief description of possible changes in Class III pricing procedures that might remove some of the limitations of the present system.

## MARKET CHARACTERISTICS OF PRODUCTS MADE FROM CLASS III MILK

Prices for surplus milk in fluid milksheds are strongly influenced by physical qualities and market characteristics of the products manufactured from this milk. The important physical qualities are their ability to be stored and their degree of concentration, and the important market characteristics are those affecting demand for the products.

In the past, some markets have been "insulated" or protected for local suppliers. In part, this insulation resulted from the lack of adequate refrigeration and transport facilities for products other than highly concentrated items such as butter and cheese or for products requiring little special care, such as evaporated milk. Additional protection was given to local suppliers through the use of sanitary regulations, primarily the requirement that plants and farms be inspected by local officials who were authorized to inspect facilities only in a small area.

In general, this type of protection is not much of a factor in the New York-New Jersey market for manufactured dairy products. Products such as butter and cheese are subject only to Federal standards that qualify them for sale in interstate commerce. Cream for fluid use outside the Metropolitan District and milk and cream used for ice cream are regulated locally, but many of these jurisdictions accept sanitary inspection by other than local inspectors. Therefore, the milk produced in the local milkshed in excess of fluid needs--the surplus available for manufacture--competes directly with milk produced in other regions of the country. Such protection as exists results primarily from the market characteristics of the specific products. These characteristics determine the location advantage of high-quality raw milk produced and available for manufacture near the market.

Essentially, two factors determine the extent to which this location advantage protects local milk prices. The first and most obvious is the transportation cost per unit of milk-equivalent. This cost is related to the degree of concentration of the product. A second factor is the relation between the market demand and the amount of locally produced milk available. If part of total supplies must be imported from outside the milkshed, the first factor is effective. In this case an upper price limit is determined by the total costs (product price plus transport cost) of the imported supply. Where output of local products equals or exceeds market requirements, transport cost no longer operates and market prices are determined by equilibrating local supply with demand in a way that will clear the market.

Some products (in particular, butter and nonfat dry milk) can be sold by an individual seller in any quantities he wants to sell at the current market price. Other products are apparently produced by manufacturing firms only in the quantities required by the relatively fixed number of customers served by the manufacturer. Differences such as these are responsible, at least in part, for the variations in the partial net margins presented in part IV of this group of reports (6, pp. 22-40) and apparently explain the rather limited ability of manufacturers to vary output in response to changes in margins (4, pp. 7-16).

The information that follows was in part presented in earlier reports in this group. Field interviews with decision-makers in the industry furnished insight into market characteristics. Other aspects bearing on this subject have been obtained from various publications dealing with the marketing of milk and dairy products. For convenience in discussing market characteristics, products manufactured from Class III milk in the New York-New Jersey milkshed have been grouped into six major categories: (1) Milk used for the production of Class III cream; (2) ice cream; (3) a group of products including evaporated milk, sweetened condensed milk, candy products, cheese other than American, other concentrated products, and all other Class III products; (4) American cheese; (5) butter; and (6) products manufactured primarily from skim milk.

To give the reader a picture of the relative importance of these alternative Class III uses, the quantities of pooled milk going into these various products during 1959 are presented in figure 2. More of the milk was used for ice cream than for any of the other items; ice cream accounted for approximately 1.1 billion pounds in that year. The category of "evaporated milk, sweetened condensed milk, candy, products, other cheeses, other concentrated products, and all other Class III products," was a close second and used slightly more than 1 billion pounds of Class III milk during 1959. Class III cream was third in importance, also accounting for approximately 1 billion pounds of milk. Butter and hard cheese together accounted for roughly three-quarters of a billion pounds, with milk for butter making up over 60 percent of this quantity. The most important single product users of Class III milk in the pool during 1959 were fluid cream to outside markets and milk used for ice cream for other markets. In the latter case, this milk was primarily manufactured into homogenized mixes and plain condensed milk in manufacturing plants in the milkshed prior to shipment to markets other than New York City. The major outlets for these ice cream ingredients were southern Pennsylvania, northern New Jersey, and Connecticut.

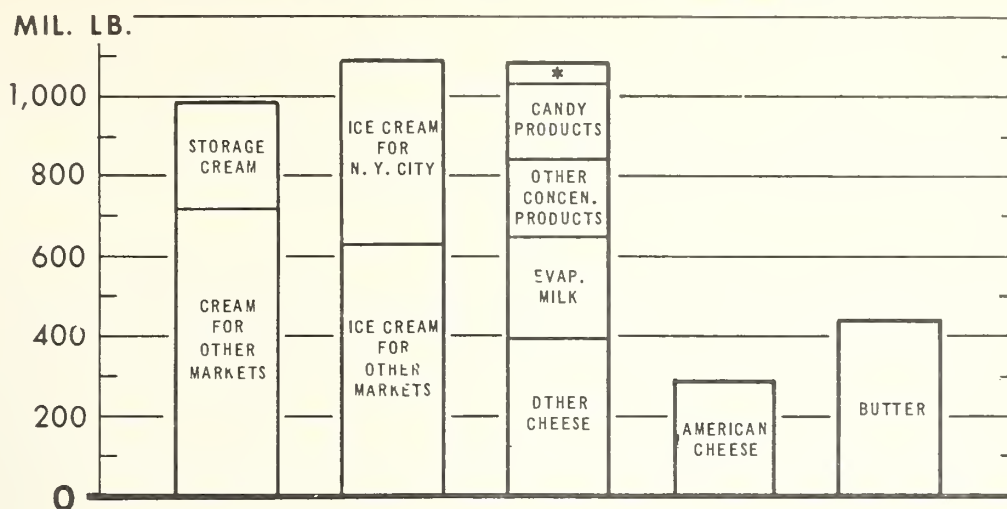
#### Class III Cream

Class III cream includes milk separated into cream--usually with 40 percent butter fat--for sale as fresh cream in areas other than the Metropolitan District, and for storage. Part of the fresh cream goes to upper New York State and northern New Jersey markets, and the rest to New England, Pennsylvania, and Maryland. In these markets, New York-New Jersey pool regulations do not require Class II designation for such milk.

Storage cream is in a somewhat special category of Class III utilization because it may be reconstituted and used as an ingredient in other products. The principal use of storage cream is for the production of sour cream (a Class II use). The manufacture of ice cream is another important use of storage cream. Most of the remainder goes into the production of reconstituted cream, cream cheese, and other soft cheeses. The raw-product cost to handlers is lower if they use storage cream



## USE OF CLASS III MILK IN FIVE MAJOR PRODUCTS, NEW YORK-NEW JERSEY MILKSHED



DATA FOR 1959

\* SWEETENED CONDENSED AND OTHER CLASS III PRODUCTS

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Figure 2

for sour cream and other Class II products than if they make these products from fresh cream. When they use unstored cream, handlers must account to the pool for milk from which the cream was separated at the Class II price. In 1959, the Class II price averaged approximately 70 cents per hundredweight more than the Class III price which determines the cost of milk for cream entering storage. When stored cream is later used for sour cream, however, handlers must then make an additional payment. Currently, this amounts to 9 cents per pound of butterfat if the milk was originally separated in the months of March through July, and 10 cents per pound of butterfat if the milk was separated during August through February. Since these are equivalent to 31.5 cents and 35 cents per hundredweight for 3.5 percent milk, the added payment amounts to one-half or less of the difference between the Class II and the Class III prices.

A further advantage to handlers is that the Class III price is normally low during the flush production season. This is when most cream is stored. Sour cream may be produced from this stored inventory during periods when prices are seasonally high. The price advantage in using storage cream rather than fresh cream to make sour cream depends on (1) the net result of adding to the Class III price the cost of placing the cream in storage and holding it there; (2) the Class II price as of the month in which the sour cream is made; and (3) the amount of the supplementary payment. Based on annual average prices for 1959, the apparent saving made possible by using storage cream for this purpose was either 35 cents or 39.5 cents per hundredweight, less the cost of freezing and storing, depending upon the months in which the cream was stored. On the other hand, the further saving that results from seasonal differences in class prices could have amounted to as much as \$1.14 per hundredweight.

## Milk Used for Ice Cream

This category includes milk used for frozen desserts and homogenized mixtures. It also includes plain condensed milk. Both of these are primarily used as ingredients for ice cream and other frozen desserts.

In field interviews for an earlier phase of this study (4, pp. 19-21) it was brought out that the market for ice cream mix was limited. Each manufacturer tended to base his output decisions on the requirements of his regular customers. Furthermore, several handlers of Class III milk indicated that they could not enter the market (or take on additional customers) for ice cream mix, simply because they could not obtain adequate supplies to satisfy customers the year round.

### Evaporated Milk, Sweetened Condensed Milk, Other Concentrated Products, Candy Products, Cheese other than American and Other Class III Uses

In 1959, more than one-third of the Class III milk used in this category went into the production of cheese other than American, mostly cream cheese and the closely related Neufchatel cheese, and Italian cheese. In 1956, the latest year for which separate statistics are available, 54 percent of this milk went into the production of Italian cheeses. The second most important use of Class III milk within this category was for evaporated milk. The use of milk for other concentrated products (primarily whole milk powder) and for candy products was next in importance. Perhaps the most important characteristic of this group of products is that, in general, plants producing these commodities are committed to the use of whole milk.

Shortly after World War II, several evaporated milk plants in this milkshed ceased operation. Today only a few plants manufacture evaporated milk in this area, with the result that this product no longer uses as much Class III milk as it used earlier.

The subgroup of other concentrated products, predominantly dried whole milk powder, used relatively large quantities of Class III milk during the period 1943-1945. Demand was heavy through the war years for highly concentrated milk products for overseas shipments. Another period of high production occurred in 1950 in response to the Korean crisis. Since 1952, however, the total quantities of Class III milk used for this purpose have been much lower.

Between 1948 and 1956 the amount of Class III milk from the New York-New Jersey pool used for the production of Italian cheese rose steadily from 27 million pounds to 135 million pounds, and an increase of 400 percent. On the other hand, the total amount of Italian cheese produced by plants in the Northeast just about doubled. Thus, milk from the New York-New Jersey pool has been replacing milk from non-pool sources in the manufacture of this product in the Northeast. Notwithstanding these increases, the Northeast produced only 26 percent of the U. S. total of Italian cheese in 1956 compared with 43 percent in 1948.

Only a few firms manufacture either cream cheese or Italian cheese. In 1958, Italian cheeses were produced in New York State by 45 plants, and in Pennsylvania by 8 plants. In total, there were 71 plants in the North Atlantic region reporting the manufacture of Italian cheeses. <sup>5/</sup> Similar information is not available, by States or by regions, on the numbers of plants making cream cheeses. For the United

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<sup>5/</sup> Many of these plants are operated by multiplant firms.

States as a whole, however, there were only 37 plants making cream cheese and 14 plants making Neufchatel cheese in 1958.

Several firms producing these manufactured dairy products, interviewed during the course of this study (4 p. 19), indicated a desire either to enter or to expand production of cream cheeses and Italian cheeses. Firms that were currently not producing and marketing cheeses of these types indicated that this market was difficult to enter, primarily because of the high importance attached to the few existing brand names.

### American Cheese

American cheese includes Cheddar, American Cheddar, Colby, washed curd, or part skim Cheddar cheese. Many cheese plants in this milkshed operate only during a 5- or 6-month period (7, p. 5). During the remainder of the year, these plants either close down completely, produce other manufactured dairy products, or operate as receiving stations. As a result, the seasonal variation of cheese output is related to (but more pronounced than) the seasonal availability of Class III milk. Cheese production in this milkshed is primarily produced when supplies of Class III milk exceed requirements for other products.

The pronounced seasonality in the production of cheese is largely a reflection of some of the contractual relationships which have been developed among firms in this milkshed. In some instances, firms operating manufactured dairy products plants lease their plants and facilities and turn over their milk supplies to specialized cheese producing firms during the flush season. Alternative types of contractual relationships involve provision for diverting milk from receiving stations to cheese plants during the spring season. In still other instances, firms having excess milk supplies will contract with another firm to produce cheese on the first firm's account. Various other arrangements exist, with the result that substantial quantities of cheese are produced under some sort of contractual arrangement.

Cheese produced in New York State is sold at a premium and to a specialized market. The price at which this cheese sells is usually 5 to 7 cents a pound higher than the prices for cheese in the primary markets in Wisconsin (6, p. 9). While New York State cheese in general commands a premium, there is a further seasonal differentiation. Although this differentiation is not clearly established in terms of price differentials, cheese buyers are reported to prefer grass cheese to fodder cheese. Grass cheese is produced from late March through June. This may be an additional explanation for the fact that most of the cheese in this milkshed is made from April to June.

In general, the quantity of butter made from New York-New Jersey pool supplies is closely related to the total quantities of Class III milk available. Seasonal patterns, in the production of cream (including storage cream), plain condensed milk, frozen desserts and homogenized mixes, and Cheddar cheese show pronounced uniformity. Variations in butter production reflect the fact that the butter outlet absorbs differences in the total quantities of Class III milk available. Because butter is a residual user of surplus milk in this milkshed, there is no well-defined seasonal production pattern for butter as there is for most other manufactured dairy products (3, p. 10).

During field interviews with management personnel, several mentioned that their firm would like to reduce output of butter. None indicated a desire to expand the production of this product. This attitude is largely explained by the low profit margin associated with butter production (6, p. 22).



There is some evidence of a tendency for butter production in the North Atlantic region to become concentrated in the New York-New Jersey milkshed. A decade or so ago, the amount of pool milk used for butter accounted for between 35 and 50 percent of all butter produced in the North Atlantic region. During the past 2 years, this share has increased to 65 percent. To the extent that milk used for butter returns lower producer prices to producers, this decreases the pool blend price (the average price for all uses). This means that New York-New Jersey pool producers are carrying a disproportionate share of the surplus in the Northeast.

### Products of Skim Milk

All of the products discussed above use both the fat and the skim components of whole milk, though in differing proportions. Some, such as evaporated milk, whole milk powder, and Cheddar cheese, are whole-milk products. That is, these products use the fat and the skim components in approximately the same proportions that exist in whole milk. Others, such as ice cream mix, cream, and butter, utilize a higher percentage of the fat portion of the milk than they do of the skim portion. In the New York-New Jersey milkshed, virtually all of the residual skim milk is manufactured into cottage cheese, condensed skim milk, and nonfat dry milk.

By far the most important use of skim milk in this area is in nonfat dry milk. A small amount of nonfat dry milk is produced under low heat processes and is primarily sold in consumer packages. It generally commands a price premium over other types of nonfat dry milk. The bulk of the nonfat dry milk produced in this area is marketed through wholesale channels, and substantial quantities are sold to the Government under the price-support program.

Condensed skim milk is primarily used as an ingredient in the production of ice cream. The market for this product, however, appears to be largely limited by the requirements of local ice cream manufacturers--chiefly those that process their own mix.

The most favorable use of skim milk (from the standpoint of handlers' margins) is for the manufacture of cottage cheese. Several of the integrated firms operating in the New York-New Jersey milkshed market cottage cheese under brand names in consumer packages. Other manufacturers package cottage cheese in 5-, 10-, or 50-pound containers for wholesale sales largely to restaurants, institutions, and to other fluid milk distributors who repackage for sale under their own label.

### PRICE DETERMINANTS IN THE MARKET

Prices in an enterprise economy play the important role of transmitting the desires of consumers to processors, suppliers of raw products, and others who control the use of productive resources. Ideally, the price of a commodity is the result of the focus of existing supply and demand conditions.

Supply and demand conditions usually involve a complex interaction of physical, institutional, and economic forces. In actual markets, for example, prices are influenced by such things as the relative market power of individual firms--either buyers or sellers that make up the industry. In fluid milk markets, of course, prices may also be affected by governmental price-fixing agencies.

The supply of milk that is eligible for fluid consumption is influenced by such

factors as the costs of dairy feed and labor, the effects of climate on the availability of roughage and the need for animal shelter, prices for milk in competing markets and for alternate uses, the relative profitability of dairying and other enterprises, sanitary regulations for production and distribution, and general levels of economic activity. The demand for milk is affected by the amount of purchasing power in the hands of consumers, and the relative prices to the consumer of dairy products and other foods. Moreover, the relative importance of these factors changes from time to time, with first one and then another exerting the more compelling influence.

While the importance of these factors in influencing milk prices may be recognized, some cannot be quantified; and for others, measurements which may be accurate at one time would not remain valid for other times. Consequently, this report cannot give a wholly unequivocal evaluation of the levels and trends of prices established in the New York-New Jersey milkshed, nor can it presume to provide an objective basis, an automatic formula, which can be used to determine appropriate price changes in the indefinite future. This report does analyze important factors which bear on this problem, however, and which provides perspective on the forces influencing and the factors affected by changes in the Class III price level in this milkshed.

### THE CLASSIFIED PRICE SYSTEM

The special characteristics of the demand and supply of milk have resulted in the development and broad use of a unique pricing system for milk eligible for fluid use. Under this system, milk of similar quality is not sold at a single price in a given market, but at different prices, depending upon the ultimate use of portions of the milk.

Milk for fluid consumption has long been considered an important part of the human diet. Moreover, it is a product for which there is, as yet, no close substitute. This is why the quantities of fluid milk demanded in any given market are quite insensitive to changes in price. Variations in supply could be expected to produce relatively large gyrations in price, if a single price for all milk were expected to clear the market. According to Benedict and Stine, "retail (fluid milk) prices might range from as low as 10 cents per quart, or lower, to as high as 40 cents, or higher. Even with these extreme fluctuations, there would undoubtedly be days when part of the demand would remain unsatisfied or when not all the milk received could be sold" (1, p. 449).

Largely because the production of milk is a biological function, the quantities produced fluctuate widely from season to season. The amount of milk produced by a cow is related to feed, management practices, the stage of lactation, and the season of the year. Of these, only feed and management practices are subject to short-run control by the herdsman. Despite various programs designed to provide incentives for leveling production, substantial seasonal variation in the amount of milk produced exists in most fluid milksheds. In the New York-New Jersey milkshed, for example, the amount of milk produced in May 1959 was 1,056 million pounds, compared with 726 million pounds in November.

Various suggestions have been made to relieve the seasonality problem. Among these is the concept of a milkshed in which the geographic boundaries of the supply area would expand and contract with seasonal changes in available supply relative to market demands. 6/

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6/ The theoretical basis for this suggestion as a means for achieving efficient market organization is discussed by R. G. Bressler (2).

In spite of the potential merit of this and other ideas to tailor market supplies more closely to market requirements, experience in milk marketing has indicated that milkshed boundaries do tend to remain fixed and that production within these boundaries is characterized by pronounced seasonal variations. <sup>7/</sup> This is the apparent result of the operation of various structural and institutional arrangements, including the operations of pooling plans, which will be discussed in a later section.

The economic forces which bring about a high degree of fluctuation in milk prices under free market conditions can be explained by the use of the diagram presented in part A of figure 3. The demand for milk eligible for fluid use in an area such as the New York-New Jersey marketing area is hypothesized as the aggregate demand for raw milk for Class I (bottled milk), Class II (bottled cream and specified products sold in metropolitan New York City), and Class III (manufactured dairy products) purposes. This demand is the schedule of quantities of raw milk from pool supplies that handlers will purchase at alternative prices. Because the volume of milk in excess of local Class I and Class II needs that is produced in a single milkshed is a small part of the total supply of milk for manufacturing, its demand schedule may be considered to be horizontal, indicating that all Class III milk can be sold, but at a price determined by forces outside of the local market. The supply of milk at any given time is taken as given--that is, although the quantity available may have been influenced by producers' price expectations during some past time period, price does not affect the total amount to be marketed during this period. It is also assumed that the total supply varies from season to season. In the diagram,  $OQ_L$  represents the amount of milk to be sold in the short season of low production while  $OQ_H$  indicates the quantities marketed during the period of high production.

In a free market, the aggregate demand in conjunction with the produced supply would determine a single price for milk in all uses. If, as represented in the diagram, the quantity  $OQ_L$  is to the left of the first "kink" in the aggregate demand function, all of the supply will be used for Class I purposes at a price determined by the level of the Class I demand ( $OP_L$ ). When the produced amount is to the right of the second kink in the aggregate demand function ( $OQ_H$ ), the total supply will be allocated among all three uses but at a uniform price ( $OP_H$ ) given by the intersection of the vertical supply function consistent with this amount and the aggregate demand schedule. The difference between  $OP_L$  and  $OP_H$  thus represents the type of price variation previously referred to, which is the result of inherent supply and demand conditions.

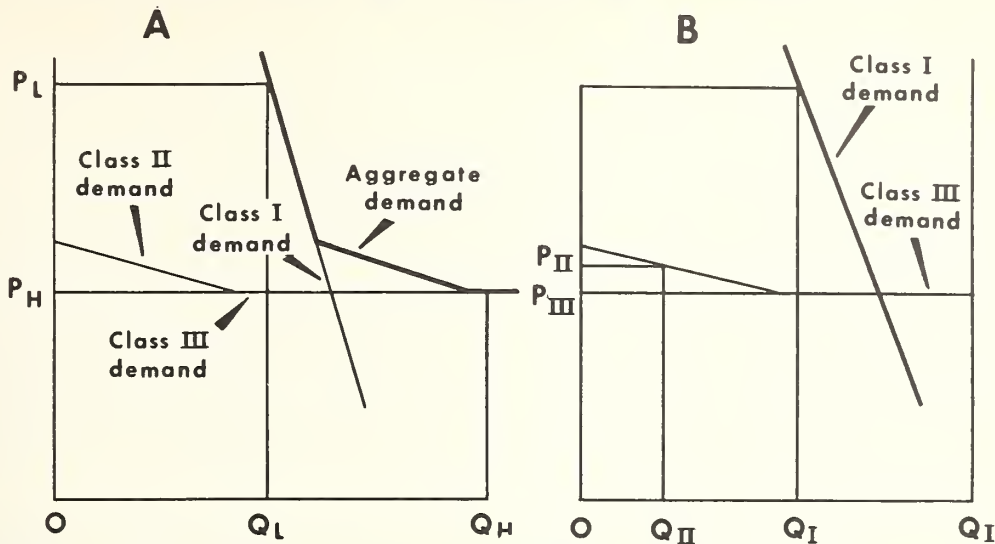
This would be the expected result if the dairy industry operated under pure competition. The organization of the dairy industry, however, through the operation of bargaining associations and of governmental price-fixing agencies, has made the classified price system possible. With administered pricing, a different price can be set for those parts of the total demand which exhibit different demand attributes. The operation and effects of this type of pricing system are suggested in part B of figure 3. Here, the same conditions depicting demand and supply are reproduced from the previous diagram. Now, however, prices are administered, rather than determined by the free operations of supply and demand forces. At the price  $OP_I$  (the Class I price), the quantity that will be used for these purposes is determined by the intersection of the horizontal projection of this price with the Class I demand schedule ( $OQ_I$ ). Similarly, with a Class II price of  $PO_{II}$ , the quantity of Class II

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<sup>7/</sup> The geographic area from which a market draws its fluid milk (Class I) does, of course, expand and contract seasonally. However, the boundaries of the total milkshed, such as that serving the New York-New Jersey marketing area, tend to remain fixed between seasons, although they may shift over time depending upon the needs of this market and those of related markets.



# HYPOTHETICAL SHORT-RUN SUPPLY AND DEMAND FUNCTIONS FOR MILK WITH ALTERNATE USES



"P" AND "Q" DESIGNATE PRICE AND QUANTITY, RESPECTIVELY; SUBSCRIPTS "L" AND "H", THE PRICE AND QUANTITIES IN SEASONS OF LOW AND HIGH PRODUCTION, RESPECTIVELY; AND ROMAN NUMERALS, CLASSES OF MILK.

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Figure 3

milk that will be used is  $OQ_{II}$ . The remaining part of the total supply ( $OQ_T$  less the sum of  $OQ_I$  and  $OQ_{II}$ ), therefore, must be disposed of for Class III purposes.

Note that if the demand for milk for Class III use is a horizontal straight line, as suggested by the simplified diagrams the price established for Class III milk must be  $OP_{III}$  or lower. The effects of arbitrary differences in the prices of Class I and Class II milk are absorbed by variations in the quantities entering these uses. If the established Class III price is higher than  $OP_{III}$ , however, no milk will be used for these purposes, and the milkshed will be faced with unsold milk. If, on the other hand, the Class III price is below  $OP_{III}$ , the result is an infinitely large excess demand. This focuses attention upon the critical importance of the level of Class III milk prices. The critical nature of the problem results largely from the relatively horizontal slope of the Class III demand function relevant to any given milkshed. This, in turn, stems primarily from the ready availability of both product and ingredients from sources outside of the milkshed and at prices determined by forces independent of (although usually recognized by) a price-fixing agency of that market.

## POOLING PROCEDURES

A classified price system determines the amount of money paid by each handler (and so, the aggregate sum paid by all handlers in the market) for the total amount of milk received from producers. The way in which this money is distributed among the individual producers who contribute to the total supply is determined by one of several types of pooling procedures.

Pooling is a method of combining and averaging the returns to a group of producers and paying each individual within the group on the same basis as all others within the same group. Various types of pools can be adopted, differing primarily in the size of the groups over which the returns are to be averaged. In a marketwide pool, returns are averaged over all producers among all distributors in a market. When an individual handler pool is used, returns to those producers serving each handler are averaged.

Pooling of some type must occur, especially where noncompetitive price differentials exist, such as those within the class-price structure. Alternatively, each handler would be required to trace milk from each source to its final disposition. Since many handlers receive milk from hundreds of producers every day, and may use milk in all of the categories, it would be highly impractical to attempt to maintain the separate identity of each shipment. Moreover, even if it could be done, this procedure would raise questions of fairness. Suppose that Jones and Smith both supply the same plant. Jones's milk may reach the plant at the time of day when milk is needed for Class I purposes. Jones, therefore, is paid for all of this milk at the (higher) Class I price. Perhaps, due to the routing of the assembly truck, Smith's milk arrives after the Class I needs have been filled and so is diverted into Class III uses. Smith then is paid at the (lower) Class III price. Such inequity is generally recognized, and the result is pooling in nearly all markets.

Pooling arrangements were referred to (above, p.16 ) in discussing the feasibility of expanding and contracting the supply areas to more closely align production to market needs. At this point it should be clear that the pooling procedures specify the group of producers included in the pool. The geographic scope of this group tends to coincide with the geographic area comprising the milkshed. In the absence of a program which provides for seasonal changes in the number of producers in the pool, milkshed boundaries tend to remain fixed.

Federal Milk Marketing Order No. 27 provides for a marketwide pool. All of the producers delivering milk to designated handlers are included in the same pool. Each producer in the market receives the same basic payment for his milk, with price differentials for differences in milkfat, location, and other factors as prescribed in the order. Each month, the Market Administrator's office computes the average usage for the market from records submitted by the designated handlers and announces a blend price to be paid producers by all these firms. Individual handlers having a higher percentage of Class I usage than the average would then pay into the pool the difference between their individual blend price and the market blend price that is paid directly to producers. Conversely, firms with an individual blend price lower than the average would be reimbursed by the pool fund for the difference between their payment to producers and the low blend price resulting from their high Class III use.

Order No. 27 further specifies that any distributor of the milk and milk products listed under the definitions of Class I and Class II uses is a regulated handler. Any plant that receives milk from producers and subsequently uses part of it as Class I or Class II on a regular basis automatically becomes a pool plant. Moreover, any other plant may be designated a pool plant provided it receives milk directly from producers, has the approval of appropriate health authorities, and stands ready to ship Class I milk to market at any time it is needed. Under these provisos, many plants that normally have nothing but Class III operations are pool plants (5, p. 15; 4, p. 41).

Since the alternative to participating in the pool may be to ship directly to a

nonpool manufacturing plant, the advantages to a producer of being a part of the pool are evident. The products of the nonpool manufacturing plant must compete with those produced in other areas, with the result that the raw product (milk) price the plant can afford to pay is presumably consistent with the net value (gross receipts from the sale of product, less processing and marketing costs) of the milk. <sup>8/</sup> These net values are normally closer to the Class III price than to the blend price, which reflects an allocation of the more attractive Class I and Class II prices. Therefore, pool participation allows a producer to share in the Class I and Class II sales in the marketing area, even though none of his own milk is actually used for these purposes.

Thus, the pooling procedures adjunct to the classified pricing system in the New York-New Jersey milkshed tend to provide an incentive for expanding the milkshed boundaries over time. Producers in distant areas who have no better alternatives are anxious to come under pool benefits. Handlers have no price-deterrent to obtaining pool status for outlying plants--even without Class I and Class II usage--since they will be compensated from pool funds for the difference between the blend price paid to producers and the Class III price in the market. <sup>9/</sup> At the same time, these handlers are protecting their future supply of milk for manufacturing purposes since their producers are receiving the higher blend returns.

#### TESTIMONY ON CLASS III PRICING AT HEARINGS UNDER THE NEW YORK-NEW JERSEY ORDERS

Proposals to modify procedures for pricing Class III milk were the subject of seven hearings on the New York-New Jersey Order between 1948 and 1957. The testimony of witnesses for major organizations at these hearings concerned not only the details of proposals for pricing Class III milk, but frequently dealt with the general principles which each group felt should govern the setting of prices.

All of this testimony has expressed the attitudes of these groups as to what function the Class III price should perform in the milkshed. These can be grouped under four major headings: (1) to limit the supply of Class III milk; (2) to ensure outlets for all milk produced; (3) to prevent major shifts in utilization from occurring within the milkshed as a response to the Class III price; and (4) to give consideration to the effect of Class III prices on the market for Class I milk in the marketing area. Interested parties have advanced various reasons for emphasizing each of these functions. Specific arguments given by each of the major groups, along with the dates of the hearings at which the proposals were made, are summarized in table 1.

One line of testimony was that the amount of Class III milk in the New York-New Jersey pool has been excessive, and that a major objective of the pricing of this class should be to decrease the supply. Representatives of one large producers' association have consistently favored changes which would discourage accumulation of Class III milk in the pool. At the time of the 1956 hearing, the supply of Class III milk had been increasing sharply for 8 years (<sup>3</sup>, fig. 2, p. 7).

Another line was that the most important criterion for pricing Class III milk

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<sup>8/</sup> This would again be the relationship between product prices and raw milk prices where the market operates perfectly.

<sup>9/</sup> Even if the Class III price were set higher than prices paid by unregulated manufacturing plants, the handler might choose to pay this if most of his competitors are pool plants.



Table 1.--Functions of Class III milk price according to testimony by specified groups and dates of hearings at which testimony was presented, 1948-57

| Function of Class III milk price                                         | Operating :<br>cooperatives :<br>1/ | Bargaining :<br>cooperatives : | Milk :<br>brokers : | Independent :<br>fluid milk :<br>distributors : | Firms processing :<br>both fluid milk :<br>and manufactured :<br>dairy products : | Ice cream :<br>manu-<br>facturers : | Food :<br>processors : |
|--------------------------------------------------------------------------|-------------------------------------|--------------------------------|---------------------|-------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------|------------------------|
| Limit supply of Class III milk:                                          |                                     |                                |                     |                                                 |                                                                                   |                                     |                        |
| Promote efficiency in processing of Class III milk.....                  | --                                  | 5/56                           | --                  | --                                              | --                                                                                | --                                  | --                     |
| Price so as not to attract supply.....                                   | --                                  | 5/56                           | --                  | --                                              | --                                                                                | --                                  | --                     |
| Price Class III high, with exceptions.....                               | 11/53, 7/58                         | --                             | --                  | --                                              | --                                                                                | --                                  | --                     |
| Butter and cheese differential effective only in May and June.....       | --                                  | 3/55                           | --                  | --                                              | --                                                                                | --                                  | --                     |
| Ensure outlets for all milk produced:                                    |                                     |                                |                     |                                                 |                                                                                   |                                     |                        |
| Move Class III (provide for all milk delivered by producers).....        | 1/49, 1/50                          | --                             | --                  | --                                              | --                                                                                | --                                  | --                     |
| Prevent loss of markets.....                                             | 1/49, 1/50, 5/56                    | --                             | --                  | --                                              | 10/53                                                                             | 1/49, 1/50                          | --                     |
| Price to encourage maintenance of facilities to handle all the milk..... | 1/49, 5/56                          | --                             | --                  | --                                              | --                                                                                | --                                  | --                     |
| Do not impose the surplus burden on the cooperatives.....                | 5/56                                | --                             | --                  | --                                              | --                                                                                | --                                  | --                     |
| Introduce transfer payments.....                                         | --                                  | --                             | --                  | --                                              | 1/50                                                                              | --                                  | --                     |
| Prevent changes in utilization:                                          |                                     |                                |                     |                                                 |                                                                                   |                                     |                        |
| Competitive with prices of products for manufacturing.....               | --                                  | 5/56, 7/58                     | --                  | --                                              | --                                                                                | --                                  | --                     |
| Prices at Midwest condenseries.....                                      | --                                  | 10/53, 5/56                    | --                  | --                                              | --                                                                                | --                                  | --                     |
| Estimated cost of transportation and handling.....                       | --                                  | 10/53, 3/55                    | 10/53               | --                                              | 10/53                                                                             | --                                  | --                     |
| Price to eliminate 13th checks at cooperatives.....                      | --                                  | 10/53                          | --                  | --                                              | --                                                                                | --                                  | --                     |
| Competition with products from nonpool sources.....                      | 3/55, 5/56, 7/58                    | --                             | --                  | --                                              | 10/53                                                                             | 1/50                                | 7/58                   |
| Keep price competitive with surrounding markets.....                     | --                                  | --                             | --                  | --                                              | 3/55                                                                              | 1/49, 1/50, 10/53                   | --                     |

Continued

1/ See footnote at end of table.

Table 1.--Functions of Class III milk price according to testimony by specified groups and dates of hearings at which testimony was presented, 1948-57--Continued

| Function of Class III milk price                                                                                 | Operating<br>cooperatives:<br>1/ | Bargaining<br>cooperatives: | Milk<br>brokers | Independent<br>fluid milk<br>distributors: | Firms processing<br>both fluid milk<br>and manufactured<br>dairy products | Ice cream<br>manu-<br>facturers | Food<br>processors |
|------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------|-----------------|--------------------------------------------|---------------------------------------------------------------------------|---------------------------------|--------------------|
| Prevent changes in utilization: (Cont.)                                                                          |                                  |                             |                 |                                            |                                                                           |                                 |                    |
| Preserve existing relations among<br>Class III products.....                                                     | --                               | 7/58                        | --              | --                                         | --                                                                        | --                              | --                 |
| Do not price separate uses.....                                                                                  | 5/56                             | --                          | --              | --                                         | --                                                                        | --                              | --                 |
| Premium on milk for ice cream.....                                                                               | --                               | 2/50                        | --              | --                                         | --                                                                        | --                              | --                 |
| Consider effect on Class I market:                                                                               |                                  |                             |                 |                                            |                                                                           |                                 |                    |
| Protect Class I price structure.....                                                                             | 1/49                             | --                          | --              | 10/53, 2/50                                | 9/58                                                                      | --                              | --                 |
| Do not allow spot market to be<br>demoralized.....                                                               | --                               | --                          | --              | --                                         | 10/53                                                                     | --                              | --                 |
| Do not give integrated firms profits<br>to use on Class I.....                                                   | --                               | --                          | --              | 10/53<br>9/48                              | --<br>9/58                                                                | --<br>--                        | --<br>--           |
| Move milk into Class I.....                                                                                      | 7/58                             | 5/56, 7/58                  | --              | --                                         | --                                                                        | --                              | --                 |
| Bonus for high Class I, penalty for<br>low (minus and plus differentials on<br>Class III individual plants)..... | --                               | 3/55                        | --              | --                                         | --                                                                        | --                              | --                 |
| Do not raise handling charges by<br>lowering Class III price.....                                                | --                               | --                          | --              | 10/53, 7/58                                | --                                                                        | --                              | --                 |

1/ All of the operating cooperatives actively carry on bargaining activities for their members. The distinction made here is that, in addition, these associations carry on processing operations--including the manufacture of dairy products.

is not whether too much milk is attracted to the market, but whether there is adequate provision for using all the milk delivered by producers. The objective, it was said, should be a price that will not force handlers to refuse to accept milk, and that will encourage them to maintain or expand facilities for handling surplus milk. This view has led to provisions (since April 1949) for lower prices for Class III milk for butter and cheese than milk for other Class III products.

Many proposals on Class III pricing sought generally to prevent changes in the pattern of utilization, rather than to move it toward some more desirable conformation. In this category were proposals to set a price that would be competitive with prices paid by manufacturing firms outside the fluid milk area; that would enable the finished products to be sold at prices competitive with products from nonpool sources; that would prevent loss of markets; that would preserve existing relations among Class III products; and that would be comparable with prices for this class of milk in surrounding fluid milk markets.

Differential pricing of milk for manufacturing, which ensures that manufacturers will accept the milk for the least profitable product, is required to assure an outlet for the total supply. It has a corollary in proposals to set higher prices for milk used for more profitable products. Some witnesses opposed such differentiation on the ground that manufacturers of these products would find alternative sources and so the New York-New Jersey pool would lose these outlets.

Some of the proposals concerning Class III prices were prompted by asserted relationships between the marketing of Class III milk and the marketing of milk for fluid use. Some witnesses argued that a high Class III price (making Class III uses unprofitable) might compel country plants to reduce handling margins for Class I milk below the cost of receiving and transporting it, to avoid potentially greater losses from utilizing the milk in manufactured dairy products. The reverse of this argument was used by others to indicate that too low a Class III price would allow abnormal profits in Class III operations and so manufacturing handlers would be unwilling to sell milk for fluid uses without receiving abnormally high handling charges.<sup>10/</sup> Also, they contended that integrated firms could use these profits on handling charges to finance unwholesome competition for sales of fluid milk and cream.

Much of the discussion of Class III pricing at the hearings grew out of the activities of cooperatives which operate manufacturing facilities, either to dispose of their entire supplies or in addition to their bargaining functions. Many of these cooperatives came into existence because their members had lost markets for their milk or because their members felt it advisable to participate actively in manufacturing to prevent the development of chaotic marketing conditions. Having undertaken processing operations, such cooperatives were as concerned as proprietary organizations that the pricing structure be related to reasonable costs of operation. These associations also stressed the need for maintaining outlets for producers' milk.

Operating cooperatives are inclined to favor low Class III prices to avoid operating losses which make net returns to members of operating cooperatives lower than returns to members of bargaining cooperatives. On the other hand, when the gross margins of cooperatives in the New York-New Jersey milkshed have been higher than operating costs, the net proceeds have been distributed as patronage dividends.

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<sup>10/</sup> Order No. 27 does not establish interhandler prices. These prices are normally negotiated on the basis of the appropriate class price plus a premium. In this market, this premium has been termed a handling charge.



Patronage dividends by predominantly manufacturing cooperatives are said to indicate that processing has been profitable, and that the Class III price could be raised without endangering the market for available supplies. This argument belongs in a family of proposals based on the proposition that the price of Class III milk should be closely related to processing, handling, and transportation costs and the selling price of the products.

Finally, there is the argument that it would be desirable for the Class III pricing procedure to be easily understood by producers.

The original testimony on Class III pricing contains much detail on the positions of various groups in the market and on specific proposals for formulas that would accomplish their objectives. The foregoing summary of this testimony (and the information in table 1) brings out what seem to be the most important issues from the standpoint of the various groups. This research was not intended to evaluate all these issues, but was limited to gaining some understanding of the market for Class III products.

### PRICES OF CLASS III MILK IN THE NEW YORK-NEW JERSEY MILKSHED

Since April 1, 1949, all milk except that used for fluid purposes (Class I) and that separated into cream and some milk drinks which are sold within the Metropolitan District of the marketing areas (Class II) has been designated Class III. Except milk manufactured into butter or cheese 11/ and some milk used for storage cream, all of this milk is priced at a single level. 12/ Before 1949, eight separate price classes were used for this milk, depending upon the specific commodities produced.

#### Changes Resulting From the 1949 and Later Amendments

The effect that the 1949 change had on the prices for milk in the separate categories in use prior to the amendment is indicated in table 2. Prices were based on the old formula in 1948 and on the new formula in 1949. Table 2 compares the actual prices in each year with what they would have been if the other formula had applied. Thus in 1948, handlers paid about 56 cents per hundredweight more for milk for storage cream than they would have if the 1949 formula were effective. Similarly, after the change in procedure became effective, the actual price for milk for storage cream was 31 cents below what it would have been without the amendment. The immediate effect of the 1949 amendment to Class III pricing procedures was to lower returns for all categories of manufacturing uses below what they would have been under the old formula. The products for which the 1949 price decrease was greatest were storage cream and the ingredients for ice cream for sale in New York City.

There have been several modifications to the procedures used to determine Class III prices since the major change in classification was made and the new formula adopted in 1949 (table 3). These amendments became effective in 1952,

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11/ Includes Cheddar, American Cheddar, Colby, and washed curd or part skim Cheddar cheese.

12/ Class III milk used for butter and cheese is subject to an adjustment which reduces the price. Class III milk entering into cream for storage and later made into Class II products (sour cream, reconstituted cream, and others) is subject to an additional payment.

Table 2.--Prices of Class III milk for specified products in 1948 and 1949, computed according to formulas in use before and after amendment effective April 1, 1949, to Federal Milk Marketing Order No. 27

|                                                                                                               | 1948           |                |                                      |           | 1949           |                |                                     |           |
|---------------------------------------------------------------------------------------------------------------|----------------|----------------|--------------------------------------|-----------|----------------|----------------|-------------------------------------|-----------|
|                                                                                                               | Old<br>formula | New<br>formula | Difference:<br>:(old minus<br>: new) |           | Old<br>formula | New<br>formula | Difference<br>:(old minus<br>: new) |           |
|                                                                                                               |                |                |                                      |           |                |                |                                     |           |
|                                                                                                               | Dol./cwt.      | Dol./cwt.      | Dol./cwt.                            | Dol./cwt. | Dol./cwt.      | Dol./cwt.      | Dol./cwt.                           | Dol./cwt. |
| Class before 1949                                                                                             |                |                |                                      |           |                |                |                                     |           |
| II B: Storage cream, plain condensed milk,<br>frozen desserts, and other products<br>in New York City .....   | 4.356          | 3.791          | 0.565                                | 3.085     | 2.775          | 0.310          |                                     |           |
| II C: Fluid cream, upstate New York and<br>northern New Jersey (special cream<br>area) .....                  | 4.226          | 3.791          | .435                                 | 2.955     | 2.775          | .180           |                                     |           |
| II D: Fluid cream, frozen desserts, and<br>other products outside special cream<br>area, New England .....    | 4.279          | 3.791          | .488                                 | 2.965     | 2.775          | .190           |                                     |           |
| II E: Fluid cream, frozen desserts, and<br>other products in New England .....                                | 4.126          | 3.791          | .335                                 | 2.855     | 2.775          | .080           |                                     |           |
| II F: Frozen desserts, cream cheese, and<br>other products, upstate New York<br>and northern New Jersey ..... | 4.126          | 3.791          | .335                                 | 2.855     | 2.775          | .080           |                                     |           |
| III: Evaporated milk, cheese other than<br>cheddar and cream, and other products ..                           | 4.028          | 3.791          | .237                                 | 2.898     | 2.775          | .123           |                                     |           |
| IV A: Butter .....                                                                                            | 3.863          | 3.651          | .212                                 | 2.840     | 2.635          | .205           |                                     |           |
| IV B: Cheese, American .....                                                                                  | 3.713          | 3.651          | .062                                 | 2.700     | 2.635          | .065           |                                     |           |

Table 3.--Summary of changes in formula factors for Class III milk price, Federal Milk Marketing Order No. 27, 1949-58

| Item                   | Amendments effective --    |                         |         |         |         |        |
|------------------------|----------------------------|-------------------------|---------|---------|---------|--------|
|                        | 4/1/49                     | 1/1/52                  | 5/1/54  | 7/1/56  | 8/1/56  | 9/1/58 |
| Butter:                |                            |                         |         |         |         |        |
| Quality .....          | Grade A (92°)              | Same                    | Same    | Same    | Same    | Same   |
| Market .....           | New York                   | Same                    | Same    | Same    | Same    | Same   |
| Service .....          | USDA                       | Same                    | Same    | Same    | Same    | Same   |
| Range .....            | Highest                    | Midpoint                | Same    | Same    | Same    | Same   |
| Premium .....          | +\$0.02                    | Same                    | Same    | 1/ Same | 2/ Same | Same   |
| Yield .....            | 1.24                       | 1.22                    | Same    | Same    | Same    | Same   |
| Cream .....            | 3/ Boston weighted average | Same                    | Deleted | ---     | ---     | ---    |
| Nonfat dry milk:       |                            |                         |         |         |         |        |
| Type .....             | Roller                     | .7 roller plus .3 spray | Same    | Same    | Same    | Same   |
| Quality .....          | Human consumption          |                         |         |         |         |        |
| Market .....           | New York                   | Chicago area            | Same    | Same    | Same    | Same   |
| Service .....          | Producers Price            |                         |         |         |         |        |
| Yield .....            | Current                    | USDA                    | Same    | Same    | Same    | Same   |
|                        | 7.5                        | 7.8                     | Same    |         |         |        |
| Make allowance:        |                            |                         |         |         |         |        |
| Amount .....           | 4/ -\$0.80                 | -\$0.80                 | 5/ Same | -\$0.80 | 6/      | Same   |
| Seasonal adjustment .. | None                       | None                    | None    | 6/      |         | 6/     |

See footnotes at end of table. Continued



Table 3.--Summary of changes in formula factors for Class III milk price, Federal Milk Marketing Order No. 27, 1949-58--Continued

| Item                      | Amendments effective -- |            |           |                   |              |                           |
|---------------------------|-------------------------|------------|-----------|-------------------|--------------|---------------------------|
|                           | 4/1/49                  | 1/1/52     | 5/1/54    | 7/1/56            | 8/1/56       | 9/1/58                    |
| Butter-cheese adjustment: |                         |            |           |                   |              |                           |
| Amount                    | 7/-\$.04                | 8/Same     | Same      | -\$0.04 Mar.-June | Same         | Reduced to zero Aug.-Nov. |
| Location limit            | 2/                      | Same       | Same      | -\$0.03 July-Feb. | 10/Curtailed | Same                      |
| Federal Register Citation | 14FR 1466               | 16FR 12851 | 19FR 2512 | 21FR 4853, 5672   | 22FR 4643    | 23FR 6740                 |

- 1/ August through February add \$.03 more if utilization adjustment percentage is more than 92.
- 2/ August through February add \$.03 more if utilization adjustment percentage is more than 107.4.
- 3/ In lieu of butter, if higher than butter, August through February. Divide price per can by 33.48.
- 4/ Consisting of \$.10 transportation and \$.07 handling.
- 5/ For May and June 1954 only, raise to \$.90.
- 6/ In effect reducing the make allowance by \$.13 July-November, \$.10 December-February, \$.08 March-April, and \$.05 May-June.
- 7/ Amount per pound of butterfat.
- 8/ Subject to adjustment, March through July, when ratio of cheese price to prices of butter and nonfat dry milk exceeds specified amount.
- 9/ Beyond 325-mile zone decrease the butter-cheese adjustment by 1 cent for each 25 miles up to 7 cents.
- 10/ Maximum reduction in butter-cheese adjustment limited to 4 cents.

1954, 1956, 1957, and 1958. Table 4 presents estimates of the effect that the various amendments have had on the average level of Class III prices. Actual prices which were received in the year preceding the amendment are compared with what the prices would have been during that year if the amendment had been effective. Thus, during 1948 the average Class III price was \$4.122. Using 1948 prices and the 1949 formula, the calculated price for 1948 was \$3.791--a reduction of about 33 cents per hundredweight. Similarly, the 1952 amendment would have resulted in prices about 3 cents higher in 1951 than actually were in effect, while the 1954 and 1956 amendments would have resulted in prices 1 cent lower in 1953 and 10 cents higher in 1955 than the actual prices. The effect of the 1949 and 1954 amendments was to reduce Class III price levels, while the 1952 and 1956 modifications increased the prices.

Table 4.--Actual prices of Class III milk containing 3.5 percent butterfat, and calculated prices based on formulas adopted later, New York-New Jersey market, 201-210 mile zone, selected years, 1948-1956

| Year      | Actual price<br>(under existing<br>formula) | Calculated price<br>(if new formula<br>had been in use) | Difference<br>(actual minus<br>calculated) | Date new formula<br>was adopted |
|-----------|---------------------------------------------|---------------------------------------------------------|--------------------------------------------|---------------------------------|
|           | Dol./cwt.                                   | Dol./cwt.                                               | Dol./cwt.                                  |                                 |
| 1948..... | 4.122                                       | 3.791                                                   | 0.331                                      | April 1, 1949                   |
| 1951..... | 3.374                                       | 3.403                                                   | - .029                                     | January 1, 1952                 |
| 1953..... | 3.220                                       | 3.212                                                   | .008                                       | May 1, 1954                     |
| 1955..... | 2.878                                       | 2.978                                                   | - .100                                     | July 25, 1956                   |

#### Current Class III Pricing Procedure

According to the version of Milk Marketing Order No. 27 that became effective September 1, 1958, the Class III price for milk testing 3.5 percent butterfat at the 201-210 mile zone is computed by the following formula:

$$3.5 \sqrt{(P_b + .02) 1.22} + 7.8(7P_s + .3P_r) -.80$$

where  $P_b$  represents the price per pound of grade A (92-score) bulk creamery butter in the New York City market,  $P_s$  the price per pound of spray process nonfat dry milk solids, and  $P_r$  the price per pound of roller-process nonfat dry milk (solids). Both  $P_s$  and  $P_r$  are based on nonfat dry milk for human consumption, in car lots f. o. b. manufacturing plants in the Chicago area, as published by the U. S. Department of Agriculture. The butter price is subject to an adjustment of +\$.03 when the proportion of milk used for Class I exceeds specified limits during August through February.

A seasonal adjustment is added during certain periods as follows:

|                                     | <u>Cents/cwt.</u> |
|-------------------------------------|-------------------|
| July through November . . . . .     | 13                |
| December through February . . . . . | 10                |
| March and April. . . . .            | 8                 |
| May and June . . . . .              | 5                 |

Class III milk used for butter or Cheddar, American Cheddar, Colby, washed curd, or part skim Cheddar cheese, is subject to a credit of 4 cents per pound of butterfat from March through June and 3 cents per pound of butterfat in July and from December through February.

Therefore, from the price determined above, the following deductions may be made for 3.5 percent milk:

|                                     | <u>Cents/cwt.</u> |
|-------------------------------------|-------------------|
| March through June . . . . .        | 14                |
| July . . . . .                      | 10.5              |
| August through November. . . . .    | None              |
| December through February . . . . . | 10.5              |

Further, for such milk received from producers at plants in freight zones more than 325 miles from New York City, the following amounts are deducted:

| <u>Freight zones of plant</u> | <u>Cents/cwt.</u> |
|-------------------------------|-------------------|
| 326-350 miles . . . . .       | 1                 |
| 351-375 miles . . . . .       | 2                 |
| 376-400 miles . . . . .       | 3                 |
| 401 miles and over . . . . .  | 4                 |

This procedure keeps prices geared to movements in the prices of butter and nonfat dry milk solids. To the extent that (a) the yield factors (3.5 times 1.22 for butter and 7.8 for nonfat solids) represent reasonably typical performance rates for manufacturing plants of this type in the New York-New Jersey milkshed; (b) the reported prices for butter and nonfat dry milk solids reflect current returns to



manufacturers from the sale of products; and (c) the 80-cent allowance closely approximates the costs associated with manufacturing and marketing the products from a hundredweight of milk, the formula used for setting class prices under Order No. 27 may be considered to be of the net value type. Under the net value theory of pricing, milk values are determined by calculating, as accurately as possible, the gross value of the product yield of a hundredweight of milk (the quantity produced times the selling price) and deducting therefrom all of the costs (including normal profits) from the point the milk is received from producers until the products have been sold.

Under these procedures, it is reasonable to expect that the New York-New Jersey Class III prices will be closely related to prices paid farmers by dairy-products manufacturing plants in other parts of the country. The similarity of such price movements can be seen in figure 4. Here are plotted the Class III price, the Midwest condensery price, and the Midwest creamery price series from January 1953 to December 1959, by months. The Midwest condensery price is the average of prices paid by 12 Midwestern condenseries reported by the U. S. Department of Agriculture. <sup>13/</sup> The Midwest creamery price is the simple average of prices paid by creameries for the East North Central and West Central regions reported by the U. S. Department of Agriculture. <sup>14/</sup>

We have adjusted the Midwest creamery price series to a 3.5 percent milkfat content. The reported prices are those for milk of the average test received at butter plants during the reporting period. Normally, these can be adjusted by the application of appropriate milkfat differentials--the amount by which the price of a hundredweight of milk is changed for each one-tenth of a percentage differential in the milkfat test from the standard or base test. These milkfat differentials are not regularly reported for this series. The Class III prices, as well as the condensery price series, are based on 3.5 percent milkfat. In all instances, the actual test of milk received at butter plants exceeded this base test. In the series plotted in figure 4, the creamery prices have been reduced by using one-tenth of the price per pound of milkfat. In our opinion, this overstates the milkfat differential and so the adjusted Midwest prices reported herein are lower than they would be if the actual differential were known and applied.

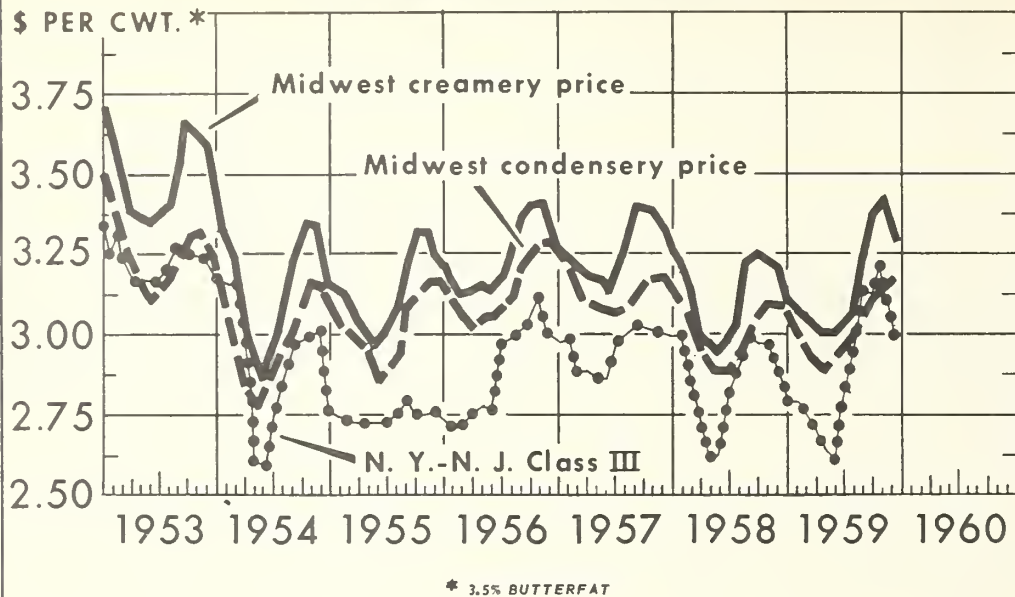
On the average, the Class III price was about 8 cents per hundredweight below the Midwest condensery price during this period and 1.5 cents below the Midwest creamery price. Regression and correlation analyses were run to measure the relationship of Class III prices to each of these Midwestern price series. While movements in Class III prices closely paralleled those in both series, they were more closely related to the creamery prices than to the condensery prices. Over 80 percent of the variation in Class III prices was explained by the creamery prices, while only approximately two-thirds of the Class III variance was explained by changes in the condensery prices. Also, the average Class III price response to a change in the creamery price was greater than it was for the condensery price. In average terms, a change of \$1 per hundredweight in the Midwest creamery price was associated with a change, in the same direction, of \$1.02 in the price per 100 pounds of Class III milk, while a change of the same magnitude in the condensery prices was accompanied, on the average, by a change of 96 cents in Class III prices.

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<sup>13/</sup> This price series is adjusted to a standard 3.5 percent milkfat content and is regularly reported in the Annual Statistics issue of the Market Administrator's Bulletin.

<sup>14/</sup> U. S. Dept. Agr., monthly report, Milk Prices Paid by Creameries and Cheese Plants.

## SELECTED PRICES OF MILK USED FOR MANUFACTURING



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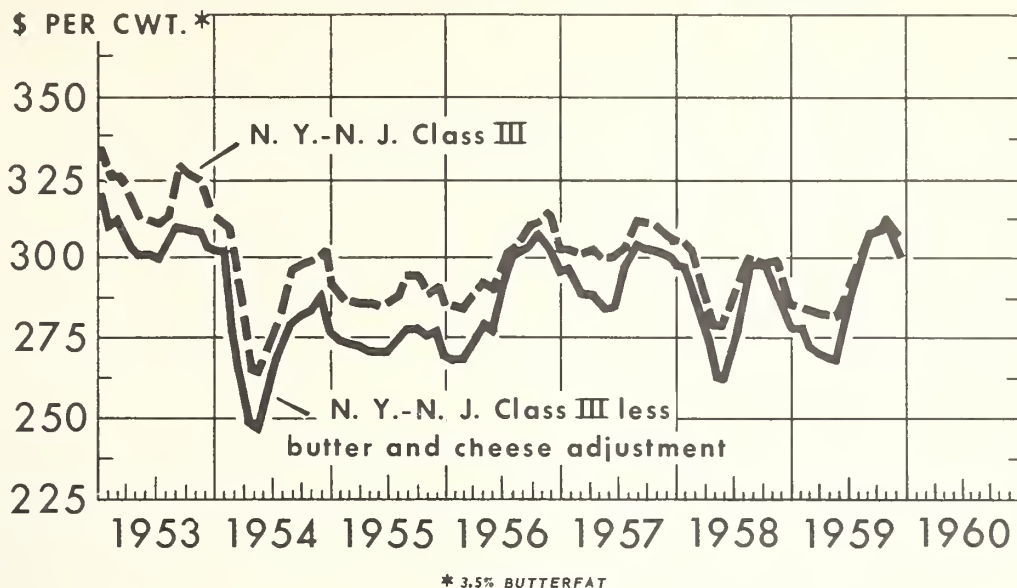
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Figure 4

For comparison, regression and correlation analyses were run between Class III prices adjusted by the Class III butterfat differential to the average test of milk received by creameries (as the independent variable) and the unadjusted creamery price series. With these data, the creamery prices averaged 6 cents per hundredweight higher than the Class III prices. Here, movements in the actual creamery prices explained over 92 percent of the variance in Class III prices; and on the average, a change of \$1 in the Midwest creamery price was associated with a change of \$1.05 in the (adjusted) Class III prices.

From April 1949 until August 1956, the amount of the butter and cheese adjustment to the basic Class III price was 4 cents per pound of butterfat (equivalent to 14 cents per hundredweight) in all months except May 1954, when it was reported to be 5 cents per pound of butterfat in the Market Administrator's Bulletin. In 1956, a seasonal factor was introduced in the butter and cheese adjustment which lowered the price reduction to 3 cents (or 10.5 cents per hundredweight) from July through February. The current procedure, eliminating the adjustment factor from August through November, became effective September 1, 1958. The effect of the butter-cheese adjustment and the relationship of the price of Class III milk and the price of milk used for butter and cheese in the New York-New Jersey milkshed can be seen in figure 5.

## PRICES OF CLASS III MILK IN NEW YORK-NEW JERSEY MILKSHED



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Figure 5

Figure 5 indicates that, with the exception of the months of August through November of 1958 and 1959, the prices paid for pool milk in the New York-New Jersey milkshed that was used for butter or cheese were consistently less than the prices paid for milk for other Class III products. The Class III milk prices (without the butter and cheese adjustment) were lower than prices paid by both Midwest condenseries and by Midwest creameries (figure 4). Therefore, manufacturers of butter and cheese that make use of pool supplies paid less for raw milk than competing creameries in the major manufacturing areas.

### CHANGES IN UTILIZATION OF CLASS III MILK ASSOCIATED WITH CHANGES IN CLASS III PRICES

Statistical data on the products manufactured from Class III milk are available in considerable detail and are regularly reported in the Market Administrator's Bulletin, issued monthly by the New York-New Jersey Milk Market Administrator. An annual summary usually is made available in the February issue of the following year. These data are collected for the primary purpose of assuring correct accounting for milk in the appropriate classification (which depends upon the use of the fat component of the milk), and include only fat-containing products. Milk products containing only nonfat solids--such as nonfat dry milk, concentrated skim milk, and cottage cheese--do not enter into these summaries. However, this omission is not critical from the standpoint of the present discussion.

It is convenient to group the various types of products made from Class III milk into a



few categories. In the discussion to follow, these combinations were adopted: Ice cream for sale in New York City; ice cream for sale in markets other than New York City; fluid cream to markets other than New York City; butter and cheese; and evaporated milk, sweetened condensed milk, milk chocolate, whole milk powder, cheese other than American, and other Class III products. Sales of storage cream and half-and-half to markets other than New York City are not considered in this analysis. In 1959, the milk used in the above five groups accounted for 92 percent of all Class III utilization.

The total amount of Class III milk in the New York-New Jersey milkshed was low during and immediately following World War II as a result of peak demands and a reduction in the total supply of milk produced in the milkshed. Beginning with 1949, however, Class III quantities increased. During the 11 years from 1949 through 1959, the increase averaged more than 200 million pounds per year.

The relationship between the quantities of Class III milk used in each of the five categories of manufactured dairy products and relative prices for milk used for these purposes was analyzed statistically. Since April 1949, these have been the Class III prices. However, before that date several of the products had other classifications and, consequently, were priced at different levels. The period covered in this analysis was the 14 years from 1946 through 1959. <sup>15/</sup>

Because price levels change as a result of the complicated interaction of many economic forces, the difference between pool prices and corresponding Midwest condensery prices was used as the independent variable expressing net changes in pool prices for these uses. The influence of changes in available pool milk supplies was measured by the total amount of Class III milk available during each period. Time (t) was introduced to eliminate the influence of the upward trend which existed in the utilization in all categories. Annual, rather than monthly, data were used to avoid the influence of seasonality, both in the availability of milk for manufacture and in the demand for the various types of products. Three linear models were applied:

$$\begin{aligned} Y &= a + b(X) + c(Z) \\ Y &= a + b(X) + d(t) \\ Y &= a + b(X) + c(Z) + d(T); \end{aligned}$$

where Y represented the quantity of milk (in million pounds per year) used in each category, X was the annual average Class III price minus the annual average price paid by Midwest condenseries, Z reflected the total Class III milk available each year, and T represented time in years from the base year (1953).

The results of these analyses, as indicated by the size of the coefficient of determination, the significance of the regression coefficients measured in terms of t-ratios, and the logical consistency of the signs attached to the regression coefficients, indicated that no single model of the above form was equally appropriate in expressing the relationship of utilization to the other factors in all five of the categories considered. Therefore, the statistics which appear in table 5 represent, in our opinion, the regression equation among the three mentioned above which best expresses the net relationship between pool milk utilization in these categories and the relative prices for milk used for such purposes. This selection, admittedly arbitrary, was based on a combination of the following three criteria: (1) the size of the coefficient of determination ( $R^2$ ); (2) the t-ratios; and (3) the sign of the regression coefficient associated with differences in prices.

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<sup>15/</sup> The authors are indebted to Professor Irving Hock for assistance in formulating the statistical models used in this analysis.

Table 5.--Summary statistics of multiple regression equations relating utilization of pool milk in selected product categories and difference between New York-New Jersey pool price and Midwest condensery price, average of annual data, 1946-59

| Equation number<br>and product                        | Regression statistics       |                                                                                               |                                     |                            |         |          |         |                |
|-------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------|----------------------------|---------|----------|---------|----------------|
|                                                       | Constant<br>term<br><br>(a) | Net regression coefficient (and t-ratio), change in<br>utilization for each unit increase in: |                                     |                            |         |          |         | R <sup>2</sup> |
|                                                       |                             | Difference in<br>prices, X<br>(b)                                                             | Total Class III<br>supply, Z<br>(c) | Time<br>(1953=0), T<br>(d) | t-ratio | Mil. lb. | t-ratio |                |
|                                                       |                             |                                                                                               |                                     |                            |         |          |         |                |
| (1) Fluid cream sold<br>outside New York<br>City..... | + 535.76                    | -4.01                                                                                         | 2.515                               | --                         | --      | +44.33   | 6.310   | 0.90           |
| (2) Ice cream sold in<br>New York City.....           | + 143.26                    | -0.52                                                                                         | 0.552                               | +0.080                     | 3.57    | --       | --      | .77            |
| (3) Ice cream sold<br>outside New York<br>City.....   | + 356.96                    | -1.04                                                                                         | 1.404                               | --                         | --      | +31.53   | 12.066  | .95            |
| (4) Evaporated,<br>condensed, and<br>other.....       | +1,303.20                   | - .42                                                                                         | 1.475                               | - .24                      | 2.008   | +99.98   | 4.364   | .88            |
| (5) Butter and cheese....                             | -1,282.18                   | +3.78                                                                                         | 0.747                               | +0.68                      | 8.327   | -89.08   | 5.08    | .94            |

1/ The values of these t-ratios were used in testing the hypotheses that the true value of b was zero for each regression. The hypothesis was rejected at the 95 percent confidence level for equation (1) and at the 90 percent confidence level for equations (3) and (4). It was rejected at the 75 percent confidence level for equation (5) and at the 70 percent confidence level for equation (2).

A substantial amount of the variance in quantities of milk used in all of these categories can be explained by the independent variables which were used. More than 75 percent of the variance in the utilization of Class III milk for ice cream sold in New York City is explained in terms of variation of relative prices and in differences in the total Class III milk supply. More than 95 percent of the variance in milk entering ice cream production for outside markets is explained in terms of price differences and the time, or trend variable.

It can be noted from the size of the t-ratios that the regression coefficients associated with the total Class III supply (c) and with trend (d) are generally more significant than coefficients associated with price differences. Furthermore, it should be noted that these two latter independent variables--Class III supply and time--are highly interrelated, as indicated by a simple coefficient of correlation among these variables of .95.

The negative signs of the regression coefficients associated with price differences (b) for the first four categories of products show that the quantities of pool milk used for cream and for ice cream and for the category of evaporated milk, condensed milk, and other Class III uses are reduced when Class III prices are high relative to Midwest prices or prices from alternative sources. This bears out the statements made by members of the industry during interviews that buyers of cream and of the ingredients for ice cream substitute milkfat and nonfat solids from sources other than pool milk when such a shift presents a price (cost) advantage (4, p. 26). There is, furthermore, evidence that buyers of milk for use in evaporated milk, sweetened condensed, milk chocolate, cheese, other than American and other Class III products tend to restrict production of these commodities when prices of milk from New York pool supplies are high relative to prices for milk for similar uses in other parts of the country. This is in spite of the fact that plants which make these products are committed to the use of whole milk rather than more concentrated sources of milkfat and nonfat milk solids.

While these regression coefficients appear to provide interesting information about the price-sensitivity of Class III milk utilization in the various products, they should be interpreted with care. The time variable (t), which was introduced in the analysis to avoid the influence of increasing trend both in the total supply of Class III milk and in utilization within each category, really explains nothing. The upward movement in supply results from the fact that total milk production in the New York-New Jersey milkshed increased after World War II more rapidly than the consumption of milk in Class I and Class II uses in the marketing area. This, in turn, was largely a supply-response of milk producers, which may be attributed to prices, the lack of alternative opportunities for resources controlled by producers, recourse to new cost-reducing technologies, or a combination of these or other stimuli. To the extent that this supply response can be attributed to price, it would be more logically related to the blend price or to the Class I price, rather than directly to the level of Class III prices in the milkshed.

The positive value of "b" for butter and cheese--indicating that the amount of pool milk used for these products increases as the differential between pool and Midwest prices increases--is consistent with the role attributed to butter and cheese as the residual users of Class III milk. As the quantities of pool milk for certain types of manufactured dairy products decrease, more milk is available for manufacture and handlers are faced with no alternative but to separate it and churn the cream into butter or to put it into cheese vats.

Again, it is difficult to explain with certainty why Class III utilization should have increased in all categories. The magnitude of the increase (a more than 180 percent increase in Class III utilization between 1946 and 1959) is far greater than can be explained



in terms of increases in such demand-influencing factors as population growth, per capita consumption, and disposable income. Not all of the manufactured dairy products consumed in the Northeast are supplied from the surplus of the New York-New Jersey milkshed, but as this surplus has increased it has contributed an expanding proportion of the total requirements.

The range in annual average price differentials between pool prices and Midwest condensery prices (the price variable used in the analysis) was not great. The maximum value of the differential when Class III prices exceeded Midwest condensery prices was 39 cents per hundredweight. This maximum differential occurred in 1948 for the category of milk for ice cream for sale in New York City, during the period when this milk was priced higher than milk for other manufacturing uses. The low value of the differential--when pool prices were 32 cents per hundredweight below Midwest condensery prices--was in 1951, at which time prices were the same for all categories except for butter and cheese which was subject to the adjustment.

This relatively small range of differentials--approximately 1-1/2 cents per quart--limits the extent to which quantity-price predictions may be made. However, within these limits, the regression coefficients listed in table 5 indicate that, with all other factors constant, a change of 1 cent per hundredweight in the differential between Class III prices and the Midwest condensery price will be associated with an annual change--in the opposite direction--of about 6 million pounds of pool milk which is utilized for ice cream and for cream sold to outside markets. <sup>16/</sup> At current levels of Class III prices and quantities, a change of this magnitude is consistent with a coefficient of elasticity with respect to price of about -0.5.

#### EVALUATING THE CLASS III PRICE

No unique procedure will provide an unequivocal evaluation of the levels and trends of prices established in the New York-New Jersey milkshed for milk for Class III purposes. On the other hand, several indicators may be used. All such measures bear, in one way or another, on supply and demand conditions related to (though not identical with) price-determining forces for milk for manufacturing purposes in this milkshed. In the following paragraphs the level and movement of Class III prices in the New York-New Jersey milkshed are compared with (1) prices paid to producers in other areas for milk for similar uses, (2) calculations of partial net margins, (3) net value computations, and (4) estimates of the cost of the fat and skim components of milk when obtained through the use of alternative ingredients.

##### Prices for Milk for Manufacturing Purposes in Other Areas

Reference has already been made (figure 4) to the relative movements of the Class III price to prices paid by Midwest condenseries and Midwest creameries for the period January 1953-December 1959. It has been noted (page 41) that these three price series are closely interrelated, and that on the average, during the period beginning January 1953 through December 1959, the Class III price in the New York-New Jersey milkshed was lower by about 8 cents per hundredweight than the Midwest condensery prices and fell 1.5 cents per hundredweight below the prices paid by Midwest creameries.

In the absence of differential costs for either processing or transporting manufactured dairy products between two regions, the logic of economics leads to the expectation of

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<sup>16/</sup> Estimated by adding the coefficients of regression on price for ice cream for New York City (-1.52); ice cream for outside market (-1.04); cream for sale in markets other than New York City (-4.01); and evaporated, condensed, and other uses (-0.42).

equal producer prices in the different areas. Where the market operates perfectly, market forces act to equalize product prices through intermarket shipments. With equal product prices, handlers operating in either region would obtain identical gross incomes from the sale of products derived from 100 pounds of milk of the same butterfat content. With the assumed equal processing costs, milk would be worth the same price to all handlers, regardless of location. Competition between handlers in the same region would force all manufacturing plants to pay producers at levels consistent with the gross income obtainable from the sale of products, less the cost of processing and marketing (including an allowance for normal profits).

The above statement of interarea price relationships is, of course, highly oversimplified. It is unreasonable to expect that the market will operate perfectly. Even under the most ideal circumstances, prices could not respond as sensitively as this hypothesis would suggest. At best, therefore, one would expect the operation of the market forces to result in a series of deviations as these prices attempt to arrive at the target equilibrium value relationship. <sup>17/</sup> The second major oversimplification stems from the assumption of equal processing cost or transportation cost differentials. This study does not analyze the nature and magnitude of differences in such costs between milk manufactured in the Midwest and milk processed into dairy products in the New York-New Jersey milkshed. Since plants located in the New York-New Jersey milkshed are closer to the New York City market than Midwest plants, and since plants in both areas ship manufactured dairy products to that market, the effect of transportation cost differentials would increase expected prices in the New York area over prices paid in the Midwest.

On the other hand, seasonal variations in the availability of milk for manufacturing purposes from Class III sources are large. Generally, the magnitude of seasonal differences in milk supplies available for manufacture are greater in fluid milk markets than in areas primarily engaged in manufacturing. Manufacturing plants in the New York-New Jersey milkshed that operate entirely from pool supplies must provide sufficient facilities to handle peak season loads. These facilities, consequently, are not utilized at full capacity during parts of the year when milk supplies are low. To the extent that costs are increased by excess capacity, processing costs for plants in the New York area may be higher than for plants in the Midwest. The differential costs of processing may be more or less than the transportation cost advantage. <sup>18/</sup>

Unless these differential processing costs exceed the transportation cost advantage, however, the evidence in figure 4 indicates that the Class III prices established in the New York-New Jersey milkshed during the 7-year period 1953-59 have been low, relative to prices paid producers by manufacturing plants in other areas.

#### Class Prices for Milk for Manufacturing in Adjacent Markets

In addition to comparing Class III prices in the New York-New Jersey milkshed with prices paid by manufacturing firms in other regions, it is pertinent to compare these prices with those established in regulated markets for milk in excess of fluid requirements in adjacent milksheds. In many instances, these surplus milk supplies compete directly for available markets.

<sup>17/</sup> In the absence of monopolistic elements, these price deviations would be expected to be distributed in a random fashion. That is, prices would not be consistently higher or lower than the competitive equilibrium value (here still considered to be zero with no transportation costs and equal processing costs between regions still being assumed). In this sense, the operation of market forces in attempting to reach equilibrium values is analogous to the operation of a thermostat which allows the room temperature to deviate around the desired temperature level. If the thermostat is operating correctly, the temperature deviations are normally and randomly distributed around the average or equilibrium level--the temperature at which the thermostat was set.

<sup>18/</sup> There is considerable question as to the extent to which excess manufacturing capacity increases processing costs in a fluid milkshed. (2, p. 122.).

The difference between the annual average prices established for Class III milk <sup>19/</sup> in the New York-New Jersey milkshed and those established under the Philadelphia and Boston orders for Class II milk (milk entering manufacturing uses) are shown in figure 6.

On the average, the Philadelphia Class II price was 5 cents and the Boston Class II price was 4 cents per hundredweight above the New York-New Jersey Class III price during the period 1948-59. The New York-New Jersey Class III price fluctuated around the Philadelphia Class II price more than around the Boston Class II price. During most years, the New York-New Jersey Class III price was lower than the comparable prices for milk in both of the adjacent regulated areas. In 1953, however, this situation was reversed, with the New York-New Jersey Class III price averaging about 8 cents per hundredweight higher than the Philadelphia Class II price and approximately 1 cent per hundredweight higher than the Boston Class II price. In 1958, the New York-New Jersey Class III price was higher than the Philadelphia Class II price, but it was lower than the Boston Class II price. This was the reverse of the situation which existed in 1957 when the New York price was lower than the Philadelphia price but slightly higher than the Boston price. In two years, 1956 and 1959, the New York-New Jersey Class III price was, on the average, virtually identical with the Philadelphia Class II price.

The data in figure 6 indicate that the New York-New Jersey Class III prices were usually low compared with prices of surplus milk from nearby regulated markets.

#### Partial Net Margins

The objective of part IV (6) of the present group of studies of Class III milk in the New York-New Jersey milkshed was to develop estimates of margins available to firms manufacturing the major products utilizing Class III milk. Analyses were made for the years 1948-57 for 11 products or product combinations. Estimates of available margins were based on calculations of the gross value of the specified product or product combinations for a given period. From this, the sum of the raw product cost (generally, the Class III price) and estimates of processing and packaging costs was subtracted (7). The resulting figures were termed partial net margins. They have been used as an index of the relative profitability of manufacturing the various alternative products from Class III milk in this milkshed. These partial net margins are considered to be the amounts available to cover selling and delivery costs, general administrative expense, and profits.

A substantial range in partial net margins was found for the various alternative product combinations during the 10-year period from January 1948 to December 1957 (figure 7). The average relative profitability during the period was lowest for milk used for Cheddar cheese (29 cents per hundredweight) and for butter and spray-process nonfat dry milk (27 cents per hundredweight). Combinations using the fat component of milk for the manufacture of ice cream mix were consistently more profitable than combinations including butter and manufacturing-grade cream. Processors able to find a market for skim milk in the form of creamed cottage cheese appeared to have more favorable margins than those manufacturing nonfat dry milk or condensed skim milk. The most favorable combination from the standpoint of margins was, therefore, ice cream mix and creamed cottage cheese. The 10-year average of the calculated margin for this combination was slightly below \$1.50 per hundredweight.

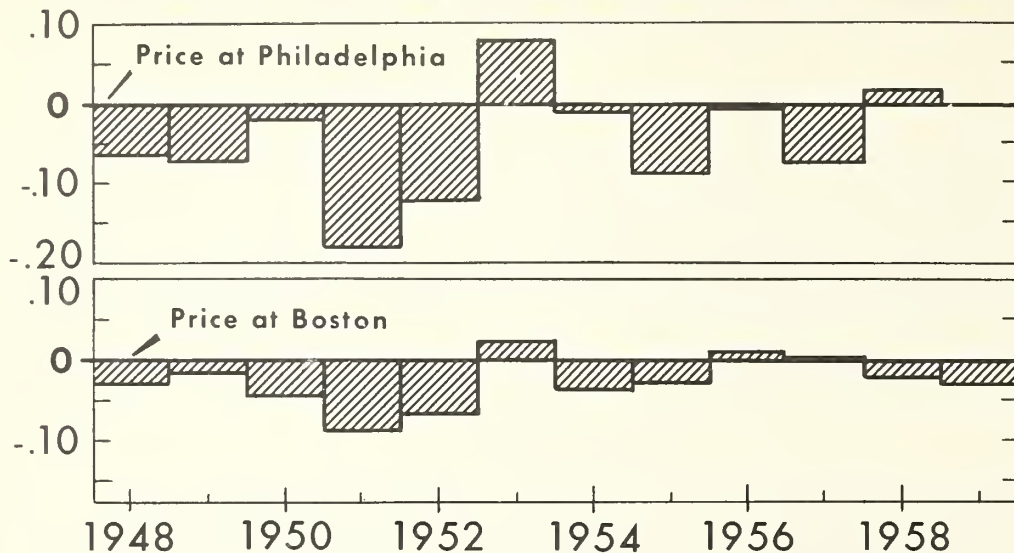
In the absence of data on costs which are not included in these calculations, such as selling and administrative expense, nothing can be said about the absolute margin of profit associated with manufacturing during this period in the New York-New Jersey milkshed. Unless, however, these omitted costs exceed the partial net margins indicated in figure 7, we must conclude that the Class III prices in the New York-New Jersey

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<sup>19/</sup> Not including the butter and cheese adjustment. See page 28.



## RELATION OF CLASS III MILK PRICE IN NEW YORK - NEW JERSEY TO CLASS II PRICE IN TWO CITIES



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Figure 6

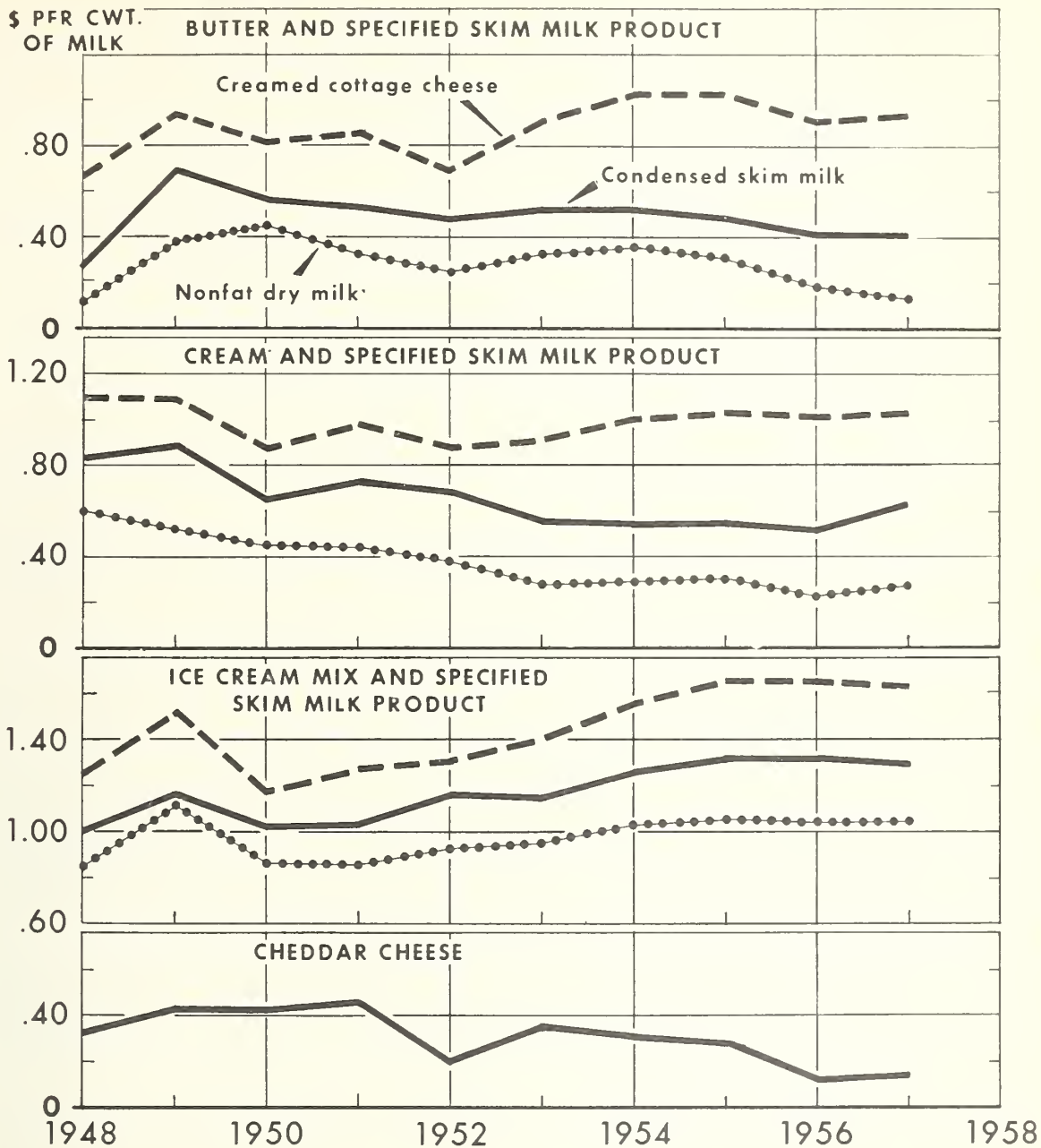
milkshed have been favorable to manufacturers of dairy products. In only 5 of 120 months was the partial net margin negative. During 2 months in 1948, the partial net margin from manufacture of butter and spray-process nonfat dry milk left no residual to cover administrative and selling expenses, or profits. During 1 month in 1948, 1 during 1952, and 1 during the latter part of 1956, the same situation existed for Cheddar cheese. With these five exceptions, the monthly margins were all positive and, as shown by figure 7, the annual average margins were all positive. <sup>20/</sup>

### Net Values of Milk Used for Manufacture

One measure by which the level and movement of Class III prices may be evaluated is the net value of the raw product to manufacturing plants. Since the relative profitability of manufacturing dairy products differs according to the specific product or product-combinations involved, milk entering each of these alternative uses can be expected to have a different net value.

<sup>20/</sup> During the period of this analysis, the total supply of Class III milk increased and the number of manufacturing plants decreased. As a result the average volume per plant rose considerably. To the extent that manufactured dairy product firms could use existing facilities more completely, this increase in volume per plant could be expected to reduce unit processing costs. The cost-reducing effect was not included in this analysis. However, fewer and larger plants probably meant higher collection and interplant transfer costs.

# PARTIAL NET MARGINS FOR CLASS III MILK PRODUCTS, NEW YORK- NEW JERSEY MILKSHED



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Figure 7

A composite net value has been determined in which variations in the net value for milk entering different uses are weighted by the proportions of the total Class III milk supply which enters into the manufacture of the different products. This procedure is logically and mathematically identical with that of determining a weighted partial net margin and adding this to the established Class III price, if the same product weights had been assigned to the margin calculations presented above.

The net value considered here is based on the f.o.b. value of the group of products manufactured from Class III at the plant shipping platform, less the cost of processing and packaging these products. The computations of net value usually involve determining (a) the types of products manufactured from Class III milk; (b) the yields of these products that can be obtained from a hundredweight of milk of the butterfat content specified (in the New York-New Jersey milkshed, 3.5 percent); (c) the f.o.b. plant prices for these products; and (d) the appropriate processing costs.

Utilization figures are available for fat-containing products from the monthly reports of the New York-New Jersey Milk Market Administrator. These reports covered the utilization of all Class III milk received by plants under Order 27. Data on the use of skim milk are available from USDA reports (8). These data showed that:

(1) Cream and homogenized mixes utilized approximately 50 percent of the total fat in Class III milk for the 5-year period 1953-57.

(2) Cheese and butter accounted for approximately 25 percent of the total Class III milkfat.

(3) All other products accounted for the remaining 25 percent of the total Class III pool milkfat.

(4) Nonfat dry milk utilized approximately 66 percent of the total skim milk used in manufactured products in the Middle Atlantic Region.

(5) Cottage cheese accounted for about 20 percent of the skim milk used in manufacturing.

(6) Condensed skim milk accounted for the remaining 14 percent of the skim milk usage.

On the basis of these figures, the following procedure was followed:

(1) A series of composite net values, by months, was developed for the 5-year period 1953-57, based on a cheese and butter operation. Since the amount of milk utilized for butter was approximately twice that used for cheese, the weighting reflected these proportions. Furthermore, it was considered that all of the skim milk resulting from the butter operation was made into spray-process nonfat dry milk (table 6).

(2) A similar net value was calculated to approximate net values for milk used for all other Class III purposes. Cream and homogenized mixes were used to reflect the values for the fat component of this milk. Twice the weight was given to cream as to homogenized mixes. All of the skim milk resulting from the cream operation was assumed to be used in spray-process nonfat dry milk, while the skim milk resulting from the production of homogenized mixes was assumed to be used for cottage cheese (table 7).

In all of the computations, the yields and the gross values were those appropriate for milk containing 3.5 percent butterfat.



Table 6.--Yield of products per 100 pounds of milk, weighting factors, and blend quantity used in calculations of net value of milk for butter and cheese

| Product              | Quantity per<br>hundredweight<br>of milk <sup>1/</sup> | Weight<br>factor | Blend quantity<br>(Col. 2 x Col. 3) |
|----------------------|--------------------------------------------------------|------------------|-------------------------------------|
|                      | Pounds                                                 |                  | Pounds                              |
| Cheese.....          | 9.295                                                  | 0.333            | 3.095                               |
| Butter.....          | 4.170                                                  | .667             | 2.782                               |
| Nonfat dry milk..... | 8.562                                                  | .667             | 5.710                               |

<sup>1/</sup> Yields were determined on the basis of formulas in part IV (6, p. 8) of this study, where fat content is held constant at 3.5 percent.

Table 7.--Yield of products per 100 pounds of milk, weighting factors, and blend quantity used in calculations of net value of milk for manufactured dairy products other than butter and cheese

| Product                | Quantity per<br>hundredweight<br>of milk <sup>1/</sup> | Weight<br>factor | Blend quantity<br>(Col. 2 x Col. 3) |
|------------------------|--------------------------------------------------------|------------------|-------------------------------------|
|                        | Pounds                                                 |                  | Pounds                              |
| Cream.....             | 8.521                                                  | 0.667            | 5.684                               |
| Nonfat dry milk.....   | 8.110                                                  | .667             | 5.409                               |
| Homogenized mixes..... | 20.272                                                 | .333             | 6.751                               |
| Cottage cheese.....    | 11.745                                                 | .333             | 3.911                               |

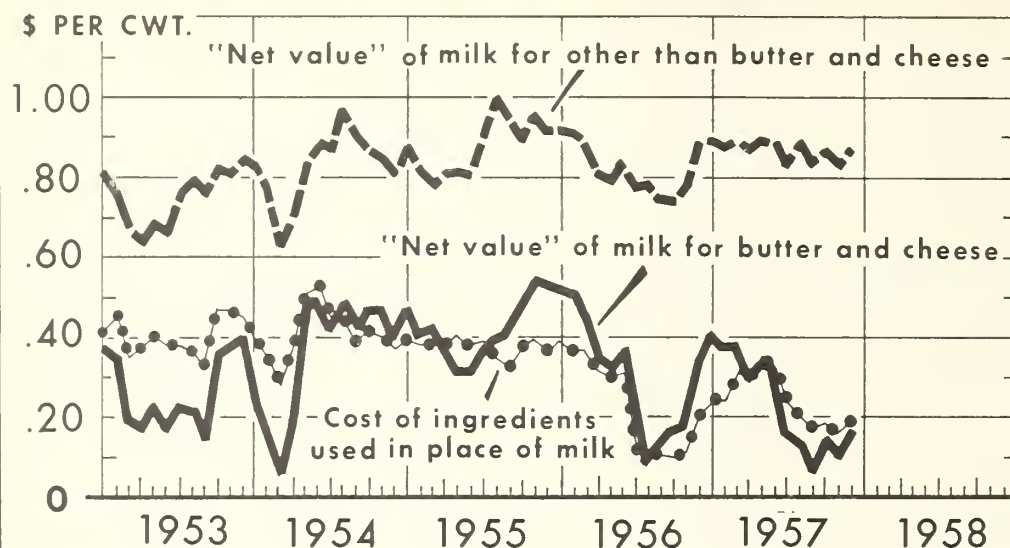
<sup>1/</sup> Yields were determined on the basis of formulas in part IV (6, p.8) of this study, where fat content is held constant at 3.5 percent.

For these calculations, the raw milk price and processing costs used were those determined for the computation of partial net margins presented in an earlier report (6).

The results of these calculations were then compared with the appropriate Class III prices effective during that period in the New York-New Jersey milkshed. Separate comparisons were made for each of the two net value series which were calculated. The net value computations for milk going into butter and cheese were compared with the Class III prices, with allowance for the butter and cheese adjustment. Net values for milk entering other uses were compared with Class III prices without this adjustment.

In all cases, the estimated net value figures were higher than the Class III prices. Class III prices were then subtracted from these estimated net values. The results appear in figure 8. The average difference between the net value of milk going into butter and cheese and the New York-New Jersey Class III price (less the butter and cheese adjustment) was approximately 35 cents per hundredweight during the 60 months from 1953 to 1957. During 1956 and 1957 the difference was below the 5-year average; the estimate was only about 25 cents per hundredweight above the Class III price for this milk. The difference between the net value computations for uses other than butter and cheese (cream, nonfat dry milk, homogenized mixes, and cottage cheese) and actual Class III prices averaged approximately 85 cents per hundredweight during the 5 years. This spread was lowest in 1953 and the first few months of 1954. After the middle of 1954 it was in the neighborhood of 90 cents per hundredweight.

## DEVIATIONS FROM CLASS III MILK PRICES NEW YORK - NEW JERSEY MILKSHED



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Figure 8

These sets of comparisons suggest that the Class III prices established in the New York-New Jersey milkshed during these 5 years were low relative to the net value of this milk to manufacturers.

### Cost of Alternative Ingredients from Sources Other Than the New York-New Jersey Milkshed

A further comparison of actual Class III prices was based on computations designed to reflect the f. o. b. plant cost--to manufacturing plants in the New York metropolitan area-- of sweet butter and spray-process nonfat dried milk, in quantities equivalent to a hundredweight of 3.5 percent milk. The sweet butter prices which were used were determined by adding 1 cent per pound to the price of 92-score butter in New York City. <sup>21/</sup> Nonfat dry milk prices were those reported by Producer's Price Current.

In this case the cost of alternative ingredients was compared with the Class III prices paid for milk used for the manufacture of dairy products other than butter and cheese. Estimates of the costs of processing milk into cream and condensed skim milk were added to the Class III price at the 201-210 mile zone. <sup>22/</sup> Twenty cents, which is approximately the cost of transporting the finished products associated with a hundredweight of milk from the 201-210 mile zone to New York, was also added to the price.

Again, these computations resulted in price estimates that were consistently above the established Class III prices (also shown in fig. 8). On the average, during these 5 years,

<sup>21/</sup> This was the amount of the premium for sweet cream butter, over the 92-score butter price, that most management officials mentioned as being appropriate during the interviews described in part V (4).

<sup>22/</sup> These processing cost estimates are based on part IV, (6, table 26).

the differential between these calculations and established Class III prices was approximately 24 cents per hundredweight.

Neither the magnitude or the stability of these deviations is surprising, due to the close similarity of the procedure used in calculating these estimates with the Class III pricing procedure in the New York-New Jersey milkshed. In fact, the only differences between these procedures are: (1) a premium of 1 cent per pound has been used in the estimated series to cover the additional costs of sweet cream butter over the standard 92-score butter (instead of the 2 cents added in Class III formula); (2) the prices for nonfat milk solids used for the estimating series were those reported for spray process, rather than the weighted average of spray-process and roller-process nonfat dry milk solids used in determining Class III prices; (3) Urner-Barry reports of nonfat milk solids in New York were used instead of USDA reports for the Chicago market; (4) the costs of processing cream and condensed skim milk and transporting these products from plants in the 201-210 mile zone to plants in New York City have been used instead of the 80 cents per hundredweight "make-allowance." The somewhat more pronounced seasonal pattern of these deviations which began in July 1956 results from adding the seasonal adjustment to the Class III price as described on page 28.

If the assumptions which underlie these calculations are correct, it appears that Class III milk prices in the New York-New Jersey milkshed during these 5 years have made milk from pool sources attractive in relation to the cost of alternative ingredients from outside areas.

#### WHAT THE MEASURES IMPLY WITH RESPECT TO CLASS III PRICES

None of the procedures discussed above give an absolute measure for evaluating either the level or the movement of Class III prices. Each focuses attention on some of the economic forces which determine appropriate price levels for this type of milk in this area. Since there is no actively competitive market, completely independent from milk in the pool, for milk for manufacturing purposes produced within the New York-New Jersey milkshed, there is no indicator that would focus attention on all of the price-influencing variables.

Furthermore, no effort has been made here to cover all types of yardsticks that might be used to compare with actual Class III prices. For example, it might be both interesting and informative to analyze the relation between changes in Class III prices and factors such as the cost of milk production, prices of other food products, and changes in disposable income of consumers, as well as various indices of the general level of economic activity within the area. Moreover, an alternative measure of the profitability of manufacturing operations in the New York-New Jersey milkshed could possibly have been obtained through a study of historic changes in the profit and loss position of firms primarily engaged in manufacturing dairy products in this area. Another possibility might have been an analysis of the size of the "thirteenth checks" (patronage refunds) distributed by operating cooperatives in this milkshed. Again, however, these further comparisons would amount to only rough guides since they also focus attention on only a few of the price-determining forces.

Comparisons in this report lead to the general conclusion that the Class III price in the New York-New Jersey milkshed has been too low during the time covered by the various analyses. A higher price for manufacturing milk would have been expected if prices had been determined by openly competitive market activity, rather than by administrative decision.



This result is neither unexpected nor surprising. It is, in fact, the result that must be anticipated where (a) the price (or prices) for the total produced supply of all of a commodity is established by administrative mandate; and (b) the pricing agency must always set prices at levels that will clear the market.

For a more complete understanding of the reasons which underlie these conclusions, the reader is asked to refer to the hypothetical short-run supply and demand functions presented in figure 3B. This diagram was used to explain how price stability could be achieved in a fluid milk market by the use of a class-price system under conditions where prices are administered.

Where the pricing agency has the responsibility for assuring that all of the milk produced finds a market, the highest price that can be set for Class III milk is the competitive price. Errors in judgment or the lack of appropriate data might result in established prices higher or lower than this competitive price. The pricing agency must always make its errors on the low side. Where more than one price is set for the same commodity, this statement does not hold true for all of the prices that are administered, but it does for at least one of these prices. Prices established for Class I and Class II milk, therefore, might be out of line without necessarily resulting in unsold milk. Class III tends to permit supplies in excess of Class I and Class II needs to find an outlet in some use. In this role, the Class III prices must be sufficiently attractive to buyers to make sure all supplies are taken.

To be sure, the pricing agency could from time to time experiment with the level of established Class III prices. By observing reactions in the market following changes in the price, they could hope to approximate this critical price level. This, however, is a dangerous procedure. The immediate response to changing prices levels is a short-run response. <sup>23/</sup> Many firms that operate manufacturing plants in the New York-New Jersey milkshed are committed to pool supplies over a short-run period. This is particularly true of firms manufacturing products requiring the use of whole milk--such as evaporated milk, sweetened condensed milk, milk chocolate, and other Class III products. If the Class III price is too high, the firm will respond not with a gradual cut-back in quantities of pool milk accepted, but rather with the eventual long-run decision to move its manufacturing operations completely out of the area. This possibility was frequently mentioned by persons having managerial responsibilities in firms manufacturing milk from Class III pool sources (4, page 26).

Any concerted effort to increase returns to milk producers through increasing prices for surplus milk must be accomplished by eliminating one of two restraints on the pricing agency. That is to say, either the price of milk entering into Class III uses must be left free to seek its own level, or the quantities of milk available must be controlled. When firms are free to reject part of the supply, an agency with the power to control prices has the alternatives of either setting price or it cannot simultaneously and independently accomplish both objectives.

In the paragraphs that follow, a few of the possible alternative methods for increasing Class III prices are discussed. There is no intent herein to recommend any particular proposal, nor in fact to suggest that a change from the present procedures is desirable. This discussion merely attempts to focus attention on the types of programs which might eliminate the requirement that administered prices for Class III milk must be low. Where possible, it is hoped that both the advantages and disadvantages of these alternatives will be considered.

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<sup>23/</sup> Furthermore, the fact that firms may deliberately react in ways they think will influence the pricing agency in their favor--a form of "gamesmanship"--must be taken into account when such experiments are attempted.

## METHODS OF INCREASING CLASS III PRICES

### Controlling Supply

The quantity of milk available for manufacture in the New York-New Jersey milkshed is a function of the total milk produced and the amounts required for Class I and Class II uses. Federal Milk Order No. 27 provides for an open, marketwide pool. Any producer who has an outlet for his milk through a pool handler can produce as much or as little milk as he desires. Similarly, producers can enter the pool or withdraw their supplies from the pool as they see fit.

In spite of the fact that changes in total pool milk supplies are reflected directly in the quantities of Class III milk, marketwide pooling spreads their impact on prices to producers over the market as a whole. Under these arrangements, price may not be an effective deterrent to milk production when Class III supplies become excessive. Producers base their output decisions on the knowledge they will receive the blend price which, in turn, can be expected to be only minutely affected by their individual decisions to expand or contract production. Milk handlers, on the other hand, decide whether or not to accept additional supplies knowing that milk entering manufacturing outlets will be priced at Class III levels, rather than the higher blend price received by producers.

As desirable as open marketwide pooling may be from the standpoint of encouraging free enterprise, it does not lend itself to control of the quantities of Class III milk to be marketed.

A Federal milk marketing order may provide for an individual handler pool instead of a marketwide pool. Under this more limited pooling arrangement, handlers would be discouraged from accepting additional milk supplies which could be used only for manufactured dairy products since this would lower their blend price and cause shippers to their plants to seek alternative outlets.

Perhaps the best known device to limit total milk supplies is the "base and surplus" plan with closed base. <sup>24/</sup> Under this system, a base quantity is established for each producer. Any milk produced and marketed in excess of this base quantity is designated surplus milk and receives the lowest class price. Base and surplus provisions of Federal marketing orders have been used to provide incentives for limiting seasonal fluctuations in production. The orders have not used closed bases which would tend to limit total quantities of milk produced within a milkshed (and so reduce total volume of pool milk), since the control of production is not permitted under the Marketing Agreement Act. <sup>25/</sup>

It is unlikely, however, that any control devices of the types mentioned can exactly equate the amount of Class III milk to the quantities that will be required by the market at the established price.

### Controlling Quantities of Milk Marketed Within the Pool

An alternative to limiting or discouraging the quantities of milk that can be produced within the milkshed would be to regulate the quantity of milk sold at the regulated price. There are several ways in which this might be accomplished.

<sup>24/</sup> The effectiveness of such a plan depends upon whether it operates with an open or a closed base. If a new base is earned each year--as in an open-base plan--incentives exist for the expansion rather than contraction of supply. If, on the other hand, the base is set without reference to current production and little opportunity exists for expanding the base through increased production--a closed-base system--the incentive is to restrict production close to the base. In this discussion, reference is made to the closed-base plan.

<sup>25/</sup> Agricultural Adjustment Act of 1937, (Public, No. 137-75th Congress- Chap. 296, 1st Session of U.S.C. 674, 50 Stat. 249.)

Geographic boundaries of the supply area could be made to expand and contract with seasonal changes in available supply relative to market demands. To facilitate this, a distinction could be made between two types of pool plants. One group of plants would have a permanent designation and would participate in the pool at all times. The second group of plants would occupy a temporary position and so could be brought in or cut off from pool status as the occasion demanded. Needless to say, a provision of this type would cause serious questions of equity, especially in the initial decision as to which plants (and their associated producers) would enjoy permanent tenure, and which plants and producers would fall in the "in and out" group.

In addition to this equity question, the existence of an outside milk supply would seriously limit the opportunity for the pricing agency to establish high Class III prices. The only apparent advantage to producers whose milk remains within the pool would be the effect that this would have in eliminating producers who are no longer able to participate in pool price benefits. Until these outside producers discontinued dairy operations or until they found other market outlets, this milk would continue to compete with Class III milk and so limit the possibilities of increasing Class III prices.

Another way to manipulate marketed quantities would be for the pricing agency to control the physical handling of a portion of the total Class III milk supply. The pricing agency could either operate its own physical facilities or it could designate one or more firms within the industry to act in its behalf. Under these circumstances, the pricing agency would no longer need be concerned with possible unsold milk. This plan would permit the use of Class III prices above the competitive price. Milk for manufacturing within the milkshed not marketed at the Class III price would be diverted to these facilities. This milk would be manufactured and marketed under the most favorable circumstances at the time. The price at which the agency would account for this milk to the pool would be the net proceeds from the sale of products after processing and marketing costs had been deducted.

Similar results would be obtained in a market in which a single producer cooperative operated surplus-milk manufacturing facilities. The cooperative might try to keep prices for Class III milk high to discourage others from investing in manufacturing facilities and promoting increases in supplies of such milk.

#### Competitive Determination of Class III Prices

With certain assumptions about the effectiveness of competition, by far the simplest solution would be to permit Class III milk prices to find their own level. This could be done without affecting the number of producers participating in the pool, nor would it necessarily require restrictions on the total amount of milk that could be produced or marketed.

In the present discussion, it is assumed that the pricing agency will continue to establish the Class I and Class II prices. Prices for milk considered to be in the pool but in excess of Class I and Class II requirements would be negotiated between individual buyers and sellers. In some cases these negotiations would take place between individual producers and proprietary manufacturing firms. In others, the negotiations would occur between cooperative associations and the firms buying milk from these associations. With a marketwide pool, as contrasted with an individual handler or individual plant pool, there would be no incentive for sellers to negotiate a low Class III price in return for a guarantee of high Class I utilization.

In the absence of bargaining power on the part of either buyers or sellers in this



market, these negotiations might tend to establish a uniform price consistent with the competitive price for all pool milk used for manufacturing in the market. At the same time, this uniform price would result in a structure of prices that would reflect competitive differentials for difference in plant location, differences in butterfat content, and other related differentials that have economic significance.

In the phase of this project that had to do with the organization and structure of manufacturing firms in the New York-New Jersey milkshed (5) it was determined that 17 out of 90 pool manufacturing plants in June 1956 were operated by cooperative associations. Furthermore, of the 353 pool and nonpool plants in operation during that month, 256 were owned by firms with but a single plant. These one-plant firms accounted for nearly 40 percent of the total milk manufactured in this milkshed. Nine firms, each of which operated 4 or more manufacturing plants, controlled a total of 63 plant operations and processed about 32 percent of the total volume of milk manufactured. These 9 large firms included 1 cooperative which operated 12 plants.

Many cooperatives, including those which operate processing plants, operate as bargaining associations in this milkshed. According to the annual report for 1959 of the Market Administrator's Bulletin, milk was received at pool plants from members of 120 cooperatives qualified to receive service payments under the pool. These qualified cooperatives accounted for more than 64 percent of the total milk delivered to the pool in 1959. More than 66 percent of the total number of producers supplying milk to the New York-New Jersey pool were members of these qualified cooperatives.

The lack of market concentration on the part of buying firms and the relative importance of cooperatives in the New York-New Jersey milkshed would seem sufficient to preclude the possibility of undue market power (on the buying side, at least) in this market.

On the other hand, the general trend away from nongovernmental regulation of prices to producers in fluid milk markets and the experience with some competitive elements of the present system for marketing Class III milk in the New York-New Jersey milkshed suggests that actual market performance might preclude the successful negotiation of Class III prices.

Government regulation of fluid milk markets began in the 1930's when fluid milk markets were demoralized and prices to producers were disastrously low. Then, bargaining between producers and milk distributors failed to maintain stability. In the 1950's, economic conditions were generally much more favorable in fluid milk markets, yet producers in unregulated milk markets continued to ask for and receive Federal milk marketing orders, and the number of States having some form of legislation to regulate milk pricing increased. To the extent that expanding assistance in maintaining producer prices results from the competitive structure of the dairy industry, there may be reason to doubt that Class III prices could be negotiated successfully, even under the comparatively favorable structure of the milk manufacturing industry in the New York-New Jersey milkshed. Individuals or even groups of producers might be under pressure to accept low Class III prices to assure a continued outlet for their milk. If regulation is needed to raise the prices of milk for some classes of use, its effectiveness could be nullified if the price of one class were unregulated. Leaving one class free to reflect competitive forces might cause that class to reflect the market imperfections that would otherwise affect prices for the other classes.

Where milk prices are determined by free market forces, competition among plants tends to keep prices in line with net values of milk (gross value of the products, less costs of processing and selling). This comes about because of the needs of the plants for milk, the availability to producers of alternative outlets, and the willingness of

producers to shift outlets if there are differences in net returns from alternative outlets.

The shifting of producers is to an important degree a function of price. Producers supplying a specialized nonpool manufacturing plant are subject to the full incentive determined by the price difference. Producers supplying a manufacturing plant that is part of a fluid milk pool, on the other hand, will be subject to a reduced incentive to shift due to the influence of Class I and Class II prices in the blend. For this reason, competition may be less effective in stabilizing prices for milk for manufacturing purposes in fluid milk areas than in manufacturing areas.

In spite of the fact that the Class III price has usually been low, there have been occasional local distress situations. A number of manufacturing plants buy Class III milk from other plants, both regularly and intermittently. These transactions are priced at the Class III price plus a handling allowance. In the field interviews, a number of these manufacturers said they bought milk from other plants only when the handling allowance was below the normal rate. Sometimes Class III milk was processed on a lease or fee-for-service basis that resulted in losses to pool handlers. At such times, in the absence of a fixed Class III price, it is probable that the losses which handlers now absorb in such transactions would be passed back to producers in the form of lower prices.

In summary, therefore, there is no guarantee that eliminating the setting of Class III milk prices would result in a more favorable price to producers than the present system does. Whether the resulting price is consistent with competitive levels or more closely resembles a monopsonistic price depends upon the relative market power of producers and manufacturers. Market power normally connotes the existence of a few large and dominant buyers vis-a-vis large number of small sellers, or vice versa. This condition prevents those with lesser bargaining power from finding other, more favorable outlets. cursory examination of the size of producers and producer associations compared with handler firms does not reveal evidence of undue power on either side of the market. However, this is not a sufficient basis upon which to predict market behavior particularly in an industry which historically has required mandatory and complete price regulation.

In many Federal order milk markets other than the New York-New Jersey marketing area, various types of premiums over the minimum established prices have been negotiated in recent years. Some of these premiums take the form of a "superpool" which applies to all milk within such a pool, while others result from direct negotiation between bargaining associations and the handlers to which their members ship milk. In either case they result in actual selling prices higher than the order prices and indicate the possibility for negotiation to reflect changes in supply and demand conditions from time to time.

#### Price Discrimination Between Class III Uses

Before April 1, 1949, milk entering manufacturing uses was divided into eight separate subclasses. Since that time, all of this milk has been considered a single class, although two separate prices have prevailed, one for milk used for butter and cheese and the other for milk used for the manufacture of other dairy products. Under conditions that exist in the New York-New Jersey milkshed, such differentials are appropriate and tend to stabilize and maintain prices. This can be illustrated by reference to figure 9, in which are shown hypothetical price relationships. Assume that only two products are manufactured from Class III milk in the New York-New Jersey milkshed. Both products can either be produced locally or can be shipped in (in final product form) from some

# MANUFACTURED DAIRY PRODUCTS: HYPOTHETICAL PRICE RELATIONS BETWEEN TWO SUPPLY AREAS\*

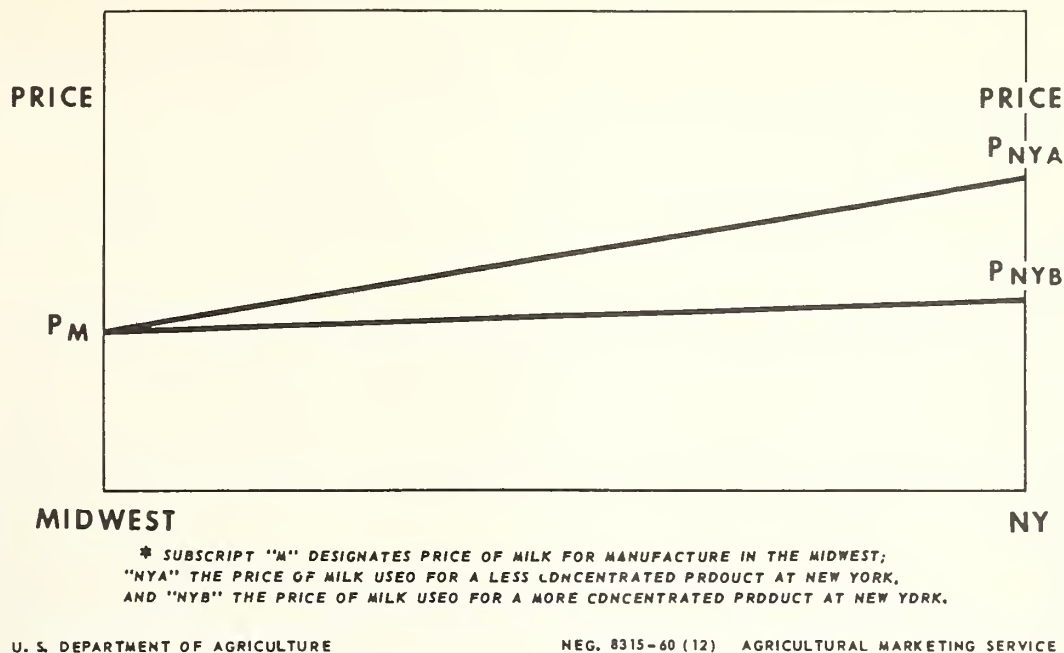


Figure 9

alternative supply area such as the Midwest. One product is bulky and expensive to transport. The other is highly concentrated and can be easily and inexpensively shipped over long distances. Assume further that both products are produced in the alternative supply area in quantities sufficient to supply the entire local market. In this diagram, the surplus producing area is labeled "Midwest" and the local market "New York."

Manufacturing plants in the Midwest produce both products. In the absence of regulated prices for milk for manufacture in this area, it is reasonable to assume that the producer milk price will be the same for milk entering each use in that area--at a level designated  $P_m$  in the diagram. Furthermore, in the absence of processing and marketing costs, both products will sell at price  $P_m$  in this region of manufactured milk production.

When these products are shipped into a deficit market, such as New York, the price the products will bear must be at least the price  $P_m$  plus the cost of transporting the product between these two points.

The less concentrated product (A) will then sell at the price  $P_{NYA}$  in the deficit market. This is the price at the production area ( $P_m$ ) plus the cost of shipment.  $P_{NYA}$  is thus the upper limit which the price of locally produced milk cannot exceed. This then represents the location advantage of milk for manufacturing purposes that is produced close to market. Rationally, since the market has been defined to be deficit in total dairy product requirements, local milk production in excess of Class I and Class II needs will all go into the production of the less concentrated of the manufactured dairy products.



Let us now assume that at times local Class III milk production may exceed the quantities required for the production of bulky manufactured products. It is then necessary to divert this additional supply into more concentrated products. Since the concentrated products (B) can be transported cheaply in terms of milk equivalent, the price at the market for B ( $P_{NYB}$ ) will be less than  $P_{NYA}$ . Therefore, the price that can be paid local producers for milk entering into product B is limited by  $P_{NYB}$ .

In the absence of differentiated prices for uses A and B, a single price will be established for all locally produced milk used for manufacturing purposes. This price will be  $P_{NYA}$  if the milk supply is less than adequate to fill the needs for product A, or  $P_{NYB}$  if the milk supply is more than enough for product A.

If a lower price is maintained for Class III milk used for butter and cheese, milk entering manufacturing uses from pool sources can find an outlet in these more concentrated products when necessary without at the same time requiring the price of all Class III milk to fall to the same level.

The advantages to be gained through further differentiation of prices for milk manufactured into alternative types of dairy products depends entirely on the demand for Class III milk from the New York-New Jersey milkshed for different products. Two essential conditions must be met before the milk can be sold at different prices. First, the reaction to changes in price must be different for the buyers of milk for one product than for buyers who plan to use it for another product. 26/ Second, buyers of Class III milk must not have equally available alternative sources of milk or the ingredients of milk. 27/

With respect to the first of these conditions, the results of the separate regression analyses summarized in table 1 indicate that buyers of Class III milk for different products may react differently to changes in price--at least in the short run. In this analysis, buyers of milk for sale as fluid cream to markets other than New York City appear to be most sensitive to changes in the relative prices of milk for manufacturing uses. Buyers of Class III milk for use in the manufacture of ice cream--both for sale in New York City and for sale in markets other than New York City--are also sensitive to changes in relative prices, although somewhat less sensitive than buyers of Class III milk for cream to outside markets. On the other hand, buyers of Class III milk for use in the manufacture of evaporated milk, sweetened condensed milk, milk chocolate, cheeses other than American, and other Class III products are apparently not sensitive to price changes.

At best, these estimates reflect short-run--or immediate--responses to price changes.

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26/ This means that the demands for milk in these uses have different elasticities with respect to price.

27/ This is slightly different from the usual statement of conditions essential for price discrimination. In the conventional statement, the second condition requires the absence of the possibility of movement of supplies (leakage) between markets and of competition from outside sources. In the case of administered milk pricing, however, techniques and procedures already developed to assure proper classification and payment for milk under a class-price plan appear adequate to take care of the leakage problem. On the other hand, the alternatives faced by a manufacturing plant which currently buys (or which may be a potential buyer of) Class III milk in this milkshed must be taken into account. These alternatives include both the possibility of a short-run substitution of milk or ingredients from other sources, and the longer-range opportunities for relocation of plants in other areas.

Therefore, some of the differences noted above may be more apparent than real. Firms using Class III milk for products such as evaporated milk and candy may be committed to the use of whole milk. Unit costs of processing at different volumes may be such that these firms will tend to purchase raw milk at relatively constant rates. However, should they have reason to expect a long-run difference in raw milk prices in favor of some alternative location, they may at this point become extremely sensitive to price.

It would seem, therefore, that while short-run differences in price sensitivity may exist between buyers of milk for different products, in the longer run these differences could easily disappear. On this basis, there is reason to doubt the wisdom of any attempt to differentiate between prices charged to buyers of Class III milk beyond that which already exists for milk going into the production of butter and cheese.

## CONCLUSIONS

The Class III price in the New York-New Jersey milkshed is affected by the returns that milk handlers can expect to receive from the products manufactured from such milk and the prices at which milk or ingredients can be obtained from alternative sources. Both are closely related to the cost of importing either finished products or highly concentrated ingredients from competing milk supply areas.

The relative profitability of processing alternative types of manufactured dairy products in the New York-New Jersey milkshed differs substantially. In general, manufacturers can expect to receive higher margins from the manufacture and sale of bulky and perishable products such as ice cream mix and cottage cheese than from highly concentrated products such as butter and nonfat dry milk solids. Yet, the market characteristics of these high-margin products are such that manufacturers are limited in the quantities that can be sold, and so excess supplies of Class III milk over these requirements must be utilized in the lower-value products.

Errors in the level of Class I and Class II prices merely affect the quantities of Class III milk available. Errors in Class III prices may result in some milk remaining unsold. If all milk produced for pool use is to find a market, this market must be acquired for Class III milk that remains after Class I and II requirements have been met. Furthermore, the demand for milk for manufacturing uses that faces a fluid milkshed is highly elastic; that is, relatively small price deviations will bring about large changes in the quantities that will be taken.

Faced with the above situation, price fixers must be certain that the levels of prices so fixed do not exceed those that will clear the market--the competitive price. In the absence of a competitive price, reliance must be placed on guides or economic indicators of what this competitive price should be. Since 1949, the sole guide used in establishing Class III prices in the New York-New Jersey milkshed has been a formula based on prices of butter and nonfat dry milk solids. By comparing the price results of this formula with several alternative procedures and by comparing Class III prices with prices for milk for similar purposes in nearby fluid markets, it appears that the Class III price has been low in recent years. Since the various guides used are admittedly imperfect indicators of the appropriate price level, no attempt has been made in this study to determine the amount by which these prices have been too low.

Efforts could be made within the existing framework to increase the average level of Class III prices. For example, the 6.5-cent premium that New York State cheese commands over similar types of cheese produced in the Midwest could logically be expropriated for producers by changing the butter and cheese differential. Further,

the fact that handlers manufacturing sour cream from storage cream pay a smaller total amount into the pool than if the alternative of using fresh cream (where payment is required as the Class II price) were followed presents a type of loophole in the Class II price structure. This could be plugged by setting the supplementary payment for sour cream manufactured from storage cream closer to the difference between the Class III price (which is applicable to storage cream) and the Class II price, less the cost of freezing and storage.

Major adjustments in the Class III price level require the adoption of procedures that would either limit the amount of pool milk available for marketing through regular commercial channels--or would free the Class III price to be determined by competitive negotiation. In either case, the advantages to be gained through enhanced prices must be measured against the costs of making such changes. Market supply control programs, in general, are unpopular because they are restrictive and necessarily inequitable among producer participants--both present and potential. The alternative of freeing the Class III price for competitive negotiation has the attraction that it more closely resembles the conditions effective under a free-enterprise system. Its main detractor, however, centers around the question of whether, under the existing institutional and organizational structure of the industry, such a system would work to the advantage of milk producers.

#### LITERATURE CITED

- (1) Benedict, Murray R. and Stine, Oscar C.  
1956. The Agricultural Commodity Program--Two Decades of Experience. The Twentieth Century Fund. New York, N. Y.
- (2) Bressler, R. G.  
1958. Pricing Raw Product In Complex Milk Markets. Agr. Econ. Res., Vol. X, No. 4. October.
- (3) Cobb, Fields W., Jr. and Clarke, D. A., Jr.  
1960. Class III Milk in the New York Milkshed: I. Manufacturing Operations. U. S. Dept. Agr., Mktg. Res. Rpt. 379, 36 pp., illus.
- (4) Herrmann, L.F., Agnew, Donald B., and Clarke, D. A., Jr.  
1961. Class III Milk in the New York Milkshed: V. Processors' Decisions on Utilization. U. S. Dept. Agr., Mktg. Res. Rpt. 462, 28 pp.
- (5) McAllister, C. E., Agnew, Donald B., and Clarke, D. A., Jr.  
1960. Class III Milk in the New York Milkshed: II. An Economic Description of the Manufactured Dairy Products Industry. U. S. Dept. Agr., Mktg. Res. Rpt. 396, 28 pp., illus.
- (6) McAllister, C. E., and Clarke, D. A., Jr.  
1960. Class III Milk in the New York Milkshed: IV. Processing Margins for Manufactured Dairy Products. U. S. Dept. Agr., Mktg. Res. Rpt. 419, 102 pp., illus.
- (7) Owens, T. R. and Clarke, D. A., Jr.  
1960. Class III Milk in the New York Milkshed: III. Costs of Manufacturing Dairy Products. U. S. Dept. Agr., Mktg. Res. Rpt. 400, 57 pp., illus.
- (8) U. S. Agr. Mktg. Ser.  
Production of Manufactured Dairy Products. U. S. Dept. Agr. Annual issues.





